THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXIV. No. 1640.] LONDON, OCTOBER 16, 1894. [46TH YEAR. PRICE 6d.

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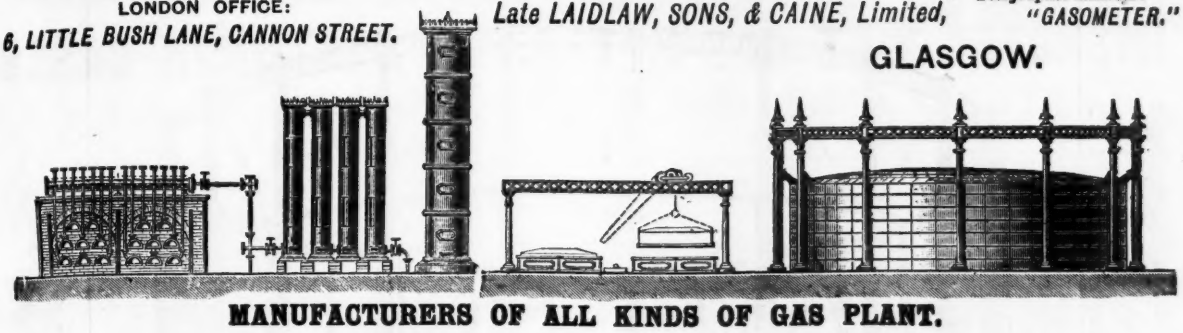

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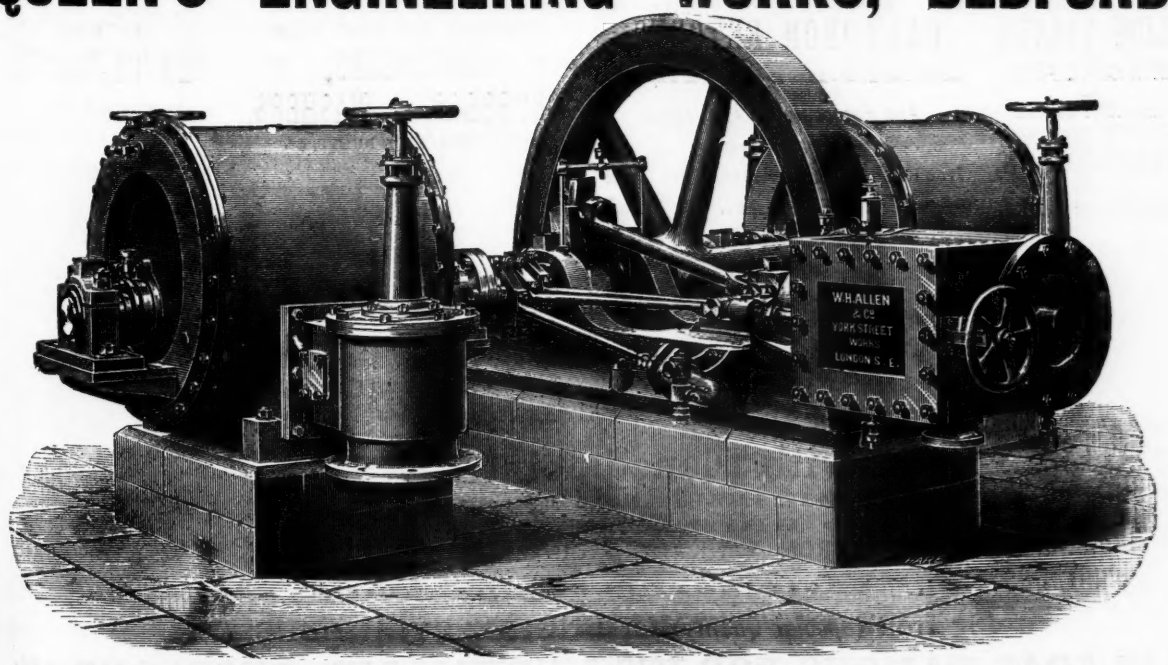

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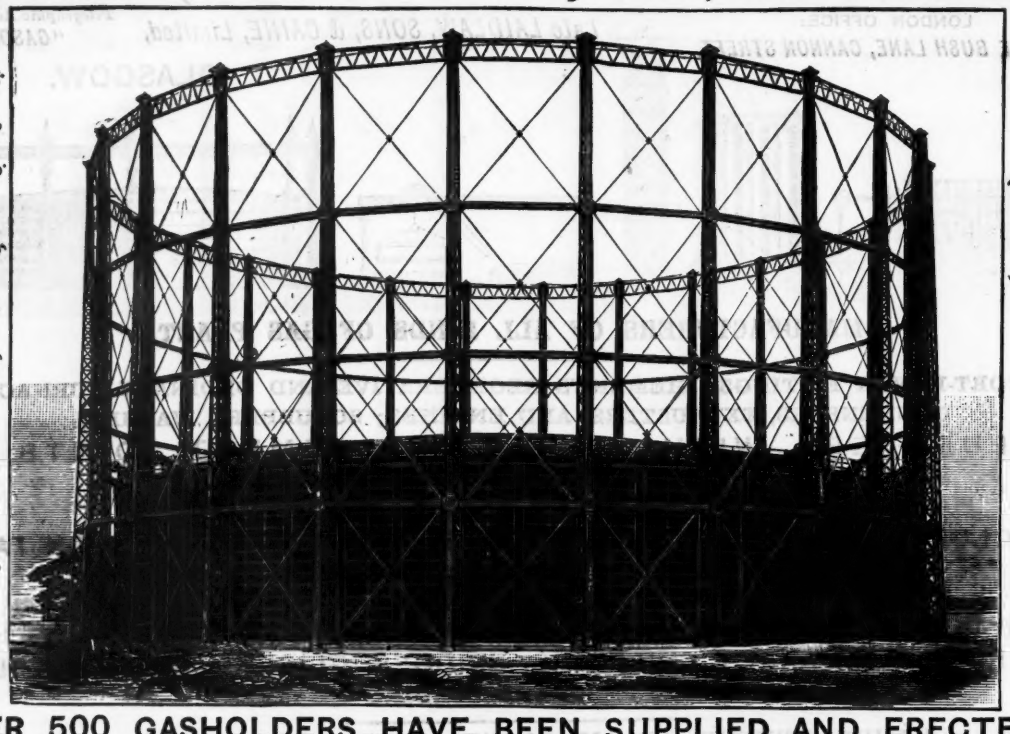

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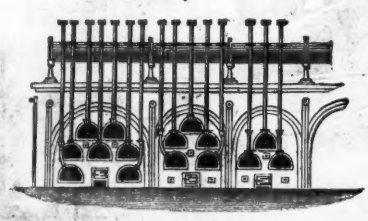

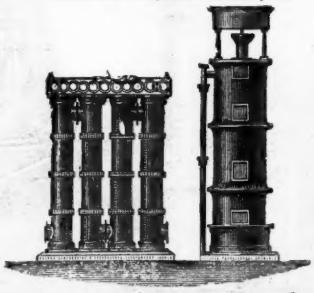

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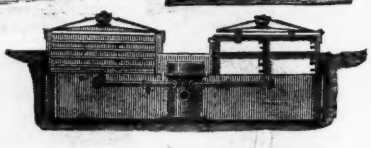

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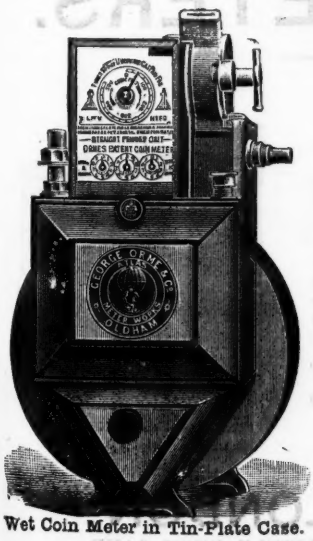
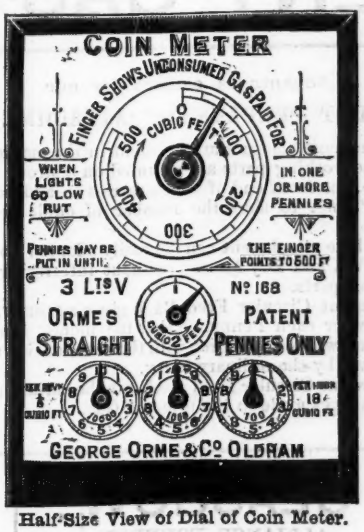
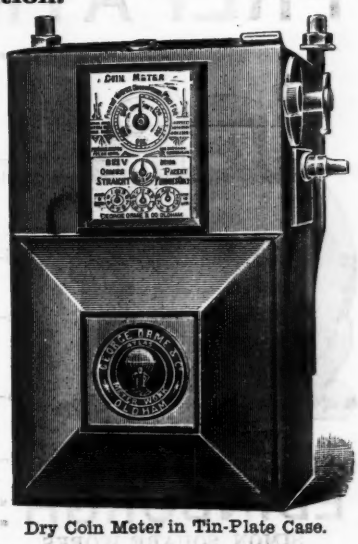


Wet Coin Meter in Tin-Plate Case.



Half-Size View of Dial of Coin Meter.



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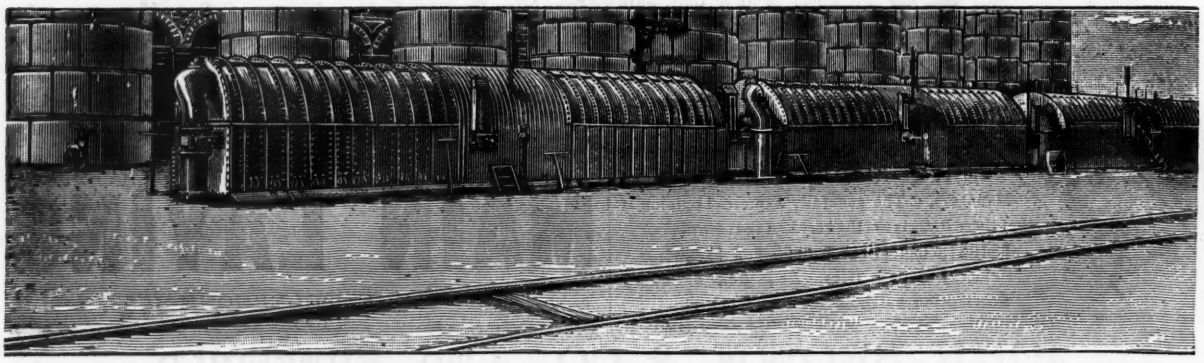

View of SIX PATENT "STANDARD" WASHER-SCRUBBERS, erected at the Beckton Station of The Gaslight and Coke Company (the Engines driving same being under Galvanized Iron Covers). This Company has **30** of these Machines in use. They are also in operation at a great number of Gas and other Works in this Country and abroad.

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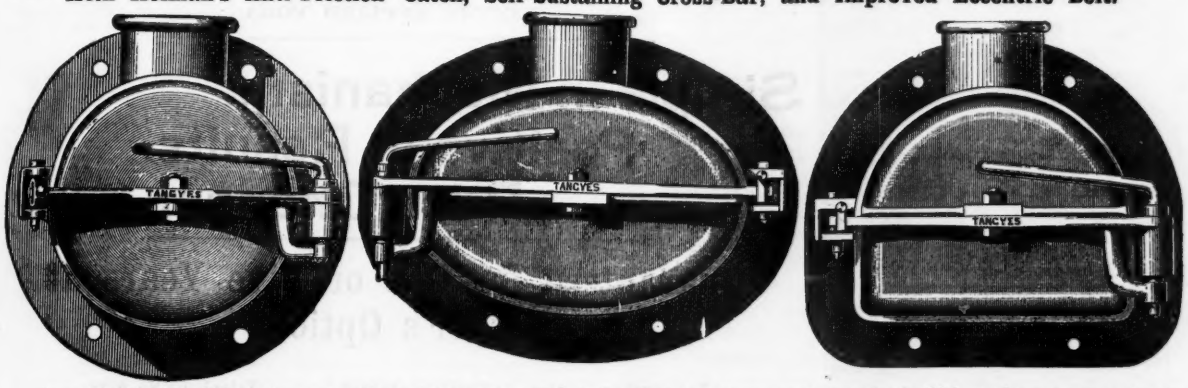
With Holman's Anti-Friction Catch, Self-Sustaining Cross-Bar, and Improved Eccentric Bolt.



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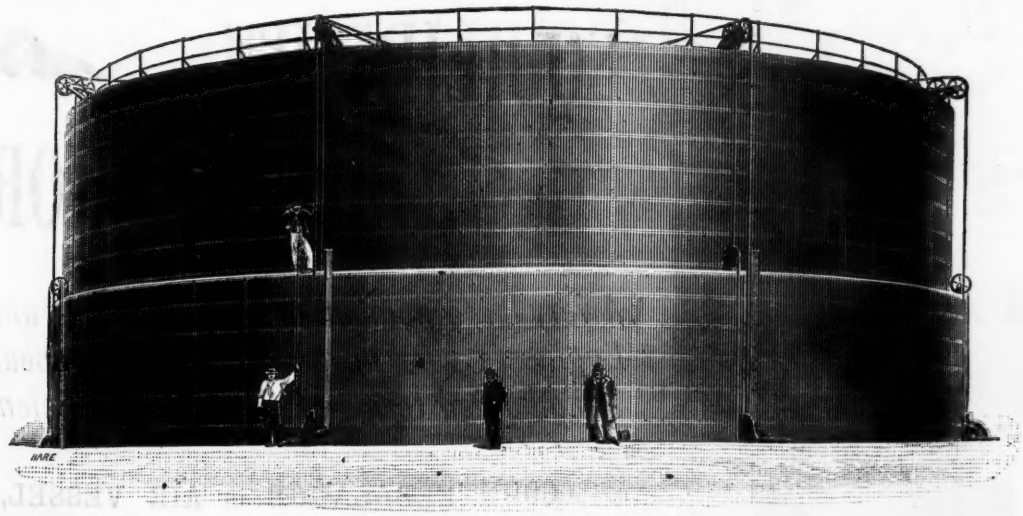

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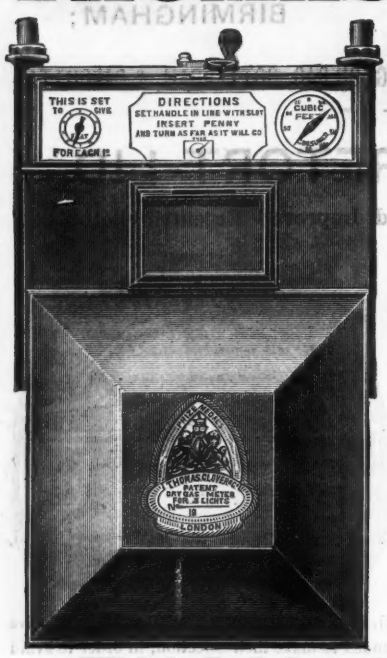

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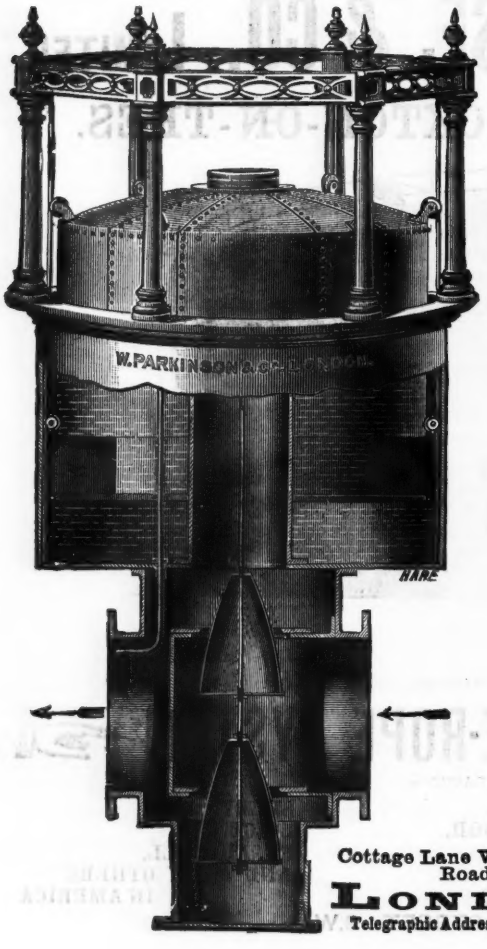

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 16, 1894.

The Gas Acts for the Year.

THE abstracts of the Private Gas Acts of last session which are to be found in the last and present issues of the JOURNAL, may be commended to the notice of all who are interested in contemporary gas legislation, as affording a means whereby the tendency of parliamentary action in this regard can be easily ascertained. Although the statutory regulation of gas undertakings in the United Kingdom proceeds upon broad lines marked out by Standing Orders, and is governed by General Acts the provisions of which are only varied to suit particular instances for special reasons, it is nevertheless true that the tenor of the Private Bill Legislation of every parliamentary session is found to change from that of its precursor; and no two Gas Acts are identical in all respects. All such Acts are alike, of course; but the likeness is not without sufficient difference to preserve the individuality which is inherent in the attributes of live organisms—for a gas undertaking is a living thing. Now-a-days, when statutory facilities of a purely routine character can be obtained for gas undertakings by way of Provisional Order, every Gas Act presupposes some special reason for its existence, which, however, does not always appear upon inspection. A good deal of light can frequently be thrown upon a particular example of gas legislation by comparing our abstract of the Bill, which appears in the spring season, with that of the completed (Royal Assented) measure as added to the Statute Book in the autumn. A whole essay of explanation and comment might be written upon the differences that arise in the scope and meaning of certain schemes of legislation in the course of their passage through Parliament; and some of the apparently minor points that can be found to show alteration in this way bulk largely in our "Parliamentary Intelligence."

Without going into details, however, it may be stated generally that gas undertakings fared reasonably well in the past session; and this is to be regarded as offering good promise for the next session. The Chairman of Committees and other influential personages who are charged with the supervision of this class of work, have had a pretty good drilling in the elements of that by no means easy department of legislative and administrative science which is concerned with the promotion of the cause of cheap gas for the people. Thanks to this, the legislation of the past session has proceeded by safe steps in the direction of reducing the cost of capital for gas purposes, and simplifying arrangements for its remuneration; while appreciation of the fundamental condition of permanent efficiency for the sliding-scale—the fixity of the initial price—has made headway. The liberty of gas companies in the matter of carrying forward surplus profits in revenue account has been restored, by the abandonment of what is known as the West Ham clause, which was designed to compel reductions of price when the undivided balance appeared to permit of this being done. The existing difference between the English and Scotch conditions of municipal gas supply, which consists in the fact that English local authorities are in general permitted to apply gas profits in aid of the district rates, while Scottish local authorities are compelled to sell gas at cost price, has received further exemplification. In the case of the Accrington District undertaking, however, where several Local Authorities have common property in the gas supply, the Scotch rule has been adopted; with the probable effect of making Accrington gas a standing annoyance to the neighbouring authorities. The modern tendency to shorten the period of repayment for municipal loans is well marked in regard to additions to gas capital. Where money is raised for the purchase of gas undertakings in the first place, at a high premium, repayment is still spread over two generations, as is only fair.

In mentioning the subject of these Gas Acts, we desire to take the opportunity of joining in the complaint that has been raised elsewhere respecting the delay of the Queen's Printers in putting the year's Acts of Parliament on sale. It is of the first importance to many industries besides that of gas supply that printed copies of the Acts of one session should be procurable in the ordinary way by the time the Bills for the next session come to be prepared. But this is certainly not the case with regard to Gas Acts; and were it not for the co-operation that has existed for many years between Parliamentary Agents and the JOURNAL, by virtue of which we are enabled to prepare our annual abstracts betimes, the agents themselves, as well as their clients, would often be gravely inconvenienced.

Liverpool Envies Plymouth.

IF there were any doubt as to the tendency of local authorities to treat gas and electricity differently in respect to street lighting, it would be removed by contrasting what has lately been going on in Liverpool with the proceedings of those municipalities who, in the name of Progress, have replaced gas by electric lamps in their streets. While many highway authorities, from the Commissioners of Sewers of the City of London downwards, have been content to increase their street lighting bills very considerably, with the object of conferring upon the public the advantages of electric lighting, the Liverpool City Council have adopted a recommendation of

their Street Lighting Committee for curtailing the gas lighting of the city thoroughfares with a view to saving about £7000 a year. This is to be effected by reducing the number of street lamps alight after midnight, and by "sweating" the lamplighters. Much good may this do the ratepayers. It is suspected, we are pleased to note, by a Liverpool newspaper, that the full extent of the apparent saving may not be realized by the inhabitants of the city. The lot of the policeman is not a happy or an enviable one anywhere; but it is evidently considered that the Force has hitherto been far too comfortable in Liverpool. Moreover, is not the burglar, and also the "corner-boy," a man and a brother, whose convenience should be regarded by permitting him a little decent obscurity wherein to carry on his favourite employment or amusement, as the case may be? At any rate, Liverpool has the satisfaction of knowing that it is the only important town in the universe that has seriously contemplated of late years the reduction of its expenses for public lighting. The most curious feature of this curious business is that the advocates of bad public lighting seem to have been encouraged in their perversity by the idea that in what they contemplated doing they were somehow punishing the Gas Company. Why they should desire to punish them, or what the Company have done to make this look a reasonable excuse for the darkening of the streets, we do not know. But assuming, for the sake of argument, that the excuse is a good one, it is the most childish delusion to hold that a Gas Company such as that of Liverpool makes a profit out of the street lighting. The Liverpool Gas Company would not lose a penny piece, but would rather gain, if every public lamp service were cut off close to the main from to-morrow.

It seems, however, to be regarded as the correct thing in Liverpool to abuse the Gas Company. Even the newspaper that protests against the latest vagary of the Street Lighting Committee is constrained to protest that it does so in the interests of the public and not of the Company; and it goes on quite superfluously to declare that "the "Directors of the monopolist enterprise have not shown "the slightest regard for the spirit of the age or the "interests of their customers. They have been actuated "solely by a desire to serve their shareholders; giving "them the regular dividend, and devoting income to the "enrichment of the undertaking rather than the advan-"tage of the consumers." And yet little more than two months have passed since the Chairman of the Liverpool Gas Company made public a statement respecting the condition and prospects of the undertaking which might have weighed for something, even in the mind of a local newspaper writer. In the same article, however, it is made to appear why all Mr. Lawrence's explanations go for naught in the Liverpudlian judgment. They have heard on the Mersey that Plymouth gets its gas for 1s. 9d. per 1000 cubic feet, and good gas too, while Liverpool pays 3s. per 1000 cubic feet, and the gas shareholders receive smaller dividends than the proprietors of the Plymouth undertaking. Why should this difference be? asks the Liverpool consumer. Well, for one good reason, because Liverpool gas is 5 candles higher in nominal illuminating power than the Plymouth article. If any enthusiast for high-grade gas needs an opportunity for proving its advantages to the consumer, now is his time, and Liverpool is the place for him. Meanwhile, and until the local press is converted, it is open to anybody to refer to the dissatisfaction with Liverpool gas as evidence of the fact that high lighting power in gas is not a guarantee for popularity.

Trade Union Leaders at Loggerheads.

WRITING in this column last week upon recent phases of Trade Unionism presented at Rotherham and Liverpool, we committed the indiscretion of grouping certain names together as constituting a combination illustrative of Union forces. Perhaps, however, the indiscretion will be forgiven if we lay stress upon the consideration that we pictured Messrs. Mann and Burns and a few of the others as acting harmoniously together some time ago. Now, of course, things are entirely different; and the individuals named are illustrating the latest working of Trade Union principles by calling one another all the opprobrious and contemptuous names they can think of. Worst of all, the Independent of Labour Parties—as professional agitators who live upon the spare cash of working men are humorously styled—are turning upon their quondam admirers among the newspaper press; and scarcely any two of the accredited Trade Union leaders agree as to what should be said and done in this cruel emergency. For it seems to be pretty generally understood that the trade of leading the working man, at his expense, is getting unprofitable. One Union after another confesses to the great difficulty of making their subscriptions balance expenses; and all the noisy federations and combinations which were to put the day labourer beyond the reach of economic laws are finding that congresses and delegates' meetings are not worth the money they cost. The collapse of the Scotch miners' strike is one of the heaviest blows that the cause of the New Unionism has had to bear; for it is a perfect demonstration of the fallacy of the idea that the seller of a commodity—be it labour or anything else—can fix its market value. From the moment that this fact comes to be recognized, the very reason for the existence of the New Unionism disappears. The old Trade Unionism has plenty to do at all times; but then this variety of Unionism exists for something else besides fomenting and organizing strikes for higher wages or against reductions of wages during periods of unprosperous trade. It is the threepenny raters that go to the wall when the economic laws that their paid leaders so boastfully deride during flush times assert their power in the way of recoil. Meanwhile, it must be an immense solace to the miners and others instrumental in appointing them to office, to learn that the Parliamentary Committee of the Trade Union Congress, having just met for a three days' conference in London, will send Mr. John Burns and Mr. David Holmes as a deputation to attend the annual conference of the American Federation of Labour, which is to be held at Denver, Colorado, in December next. Deputationizing in America must be much more pleasant than starving in Lanarkshire, even if it is just as aimless.

Problems of the People.

MR. JOSEPH CHAMBERLAIN has been speaking at Birmingham upon industrial questions; and it is a good thing when statesmen and politicians who are not Social Democrats talk before the people upon this class of subjects. For half the attraction of Socialism consists in the promise by its professors of desire and ability to do something to improve the lot of the great majority of the people, which is composed of those who have less of this world's goods than they could conveniently do with. Of course, those who are pretty well off, both for cash and culture, do not believe in socialistic ideas. But the worst of it is that the average well-to-do public man, after he has exposed the pretensions of the Socialists, has nothing to offer in their place. The majority are drawn to those who have positive promises to give, or else some tangible programme of national or social improvement to offer; and consequently, although the mass of the people may not really believe that any political party has power to cure the evil of the ages, they will turn away from the politicians who can offer nothing beyond destructive criticism of the other side. This natural reluctance of the populace to repose confidence in those would-be leaders in the State who can find nothing better to offer for their solace, in the trial and struggle of life, than assurances that "all is for the best in the best of all possible worlds," is, in the main, a salutary symptom. Mr. Chamberlain at least does not ignore or despise it; and accordingly in Birmingham he was heard talking very sympathetically concerning the need of the working classes for shortened hours of toil, cheap dwellings, facility in making provision for old age, and other undoubted benefits which civilization ought to be competent to confer. It is difficult to interest Governments in such matters, because all lasting amelioration of the condition of a community must be brought about gradually by the cumulative operation of causes separately too trivial to affect administrations. There is one little matter that we desire to mention in this connection, in the hope that it will meet the eye of somebody competent to deal with it aright. It is well known that the legislative steam-hammer, when put to the work of fashioning a statute for authorizing the construction of public works of a certain kind, is carefully adjusted so as to crack at the same time a small industrial nut, which, as a matter of fact, is generally "deaf." We allude to the insertion in such measures of the clause "against "taking the houses of persons of the labouring class." Is it not at least a plausible idea that as much good might

be done if statutory companies and municipal corporations needing money for capital purposes were directed in the same way to facilitate the investment of their savings by members of the labouring class and small capitalists generally? It is an idea that should require little commendation to the favour of those prudent philanthropists who believe that the best way to help the poor is to enable the poor to help themselves, and to preserve from robbery the savings of the thrifty.

Private Lawyers and Public Officials.

THERE is notoriously a fancy prevalent among newspaper writers and politicians who flatter themselves that they are "advanced" because they want to change everything that exists for something else, for suggesting that organized industries should be put under the control of public officials, Boards of Commissioners, or Government Departments. This craze was referred to in very sensible terms by Mr. John Hunter, President of the Incorporated Law Society, in his address to the recent meeting of the Society in Bristol. Lawyers in private practice feel very keenly the encroachments of officialism upon their preserves; and it can easily be understood how that, with the judicature in disrepute for the settlement of commercial cases on the one hand, and the official element on the other, the old-fashioned solicitor thinks it necessary to stand up for his right to live. Mr. Hunter was careful to insist upon the interest of the public in the resistance of lawyers to the increasing encroachments of officials upon their private business. He therefore remarked how experience, not only in England but also in other countries, shows that, whenever it is necessary to employ officials paid by salary —it is to be presumed in substitution for private practitioners—the former develop a great tendency to insist on all sorts of formalities, and on the strictest adherence to rules laid down for general guidance, however inapplicable they may be to some particular cases, and that the result is increase of trouble, expense, and delay. It is rather humorous to find lawyers protesting against anything that savours of unnecessary trouble, expense, and delay. A suspicion of this appears indeed to have entered Mr. Hunter's mind; for he hastened to state that, pending the arrival of the Socialistic Millennium, when legal and all other business is to be done by automatic Government machinery, it will be a proper aim for lawyers in every branch of practice "to endeavour to get rid of all "artificial restrictions and technicalities, whether they are "the result of past legislation, or of judicial rules or "decisions, or of official interference." The speaker went on to profess his conviction that "the quickest and "cheapest mode of getting a judicial decision on disputed "facts or on points of doubtful law, the quickest and "cheapest mode of realizing and distributing the property "of insolvents, whether persons or companies, the "simplest mode of administering trusts and of dealing "with land, whether by way of sale, mortgage, or settle-"ment," are the methods which, in the long run, will be best for members of the legal profession, and in this respect are objects to be aimed at. Unhappily, laymen are too often presented with evidence tending to show that the interests of the legal profession and those of the rest of the community are not invariably identical. Mr. Hunter admits that much remains to be done before laymen will concede the truth of the maxim which lawyers are so fond of quoting—that "law is the perfection of "common sense;" but it may be readily admitted, even by laymen, that this consummation is not likely to be hastened by converting the practice of law into a department of the Civil Service.

Mr. T. Newbigging, M.Inst.C.E., has been appointed valuer of the works and plant of the Driffield Gas Company, under the agreement entered into between them and the Local Board for the transfer of the undertaking.

Presentation to Mr. W. Prince.—An interesting event took place at the Stoke Gas-Works last Tuesday evening, when the employees assembled for the purpose of presenting Mr. W. Prince, the Engineer and Manager, with a marble clock, suitably inscribed, in celebration of his recent marriage. Mr. J. Stokes occupied the chair. The health of Mr. and Mrs. Prince having been drunk with musical honours, Mr. W. Mear made the presentation on behalf of the workmen. Mr. Prince, in responding, referred with pleasure to the good feeling which now exists at the gas-works, and expressed a hope for the continued prosperity of the Stoke Gas Department.

WATER AND SANITARY AFFAIRS.

THE opening of the Thirlmere Water-Works in connection with the city of Manchester at the close of last week, was an event which crowned the labour of years, and will command widespread interest. On Friday the waters of the lake were turned into the adjacent straining-well by Alderman Sir John Harwood; and on Saturday the Corporation and people of Manchester held a demonstration recognizing the fact that the water had travelled the whole length of the aqueduct, so as to enter the civic area. When Liverpool began to receive a supply from Lake Vyrnwy, as celebrated rather more than two years ago by the Duke of Connaught, it was stated that the aqueduct conveying the supply was the longest in the world. But its length of 77 miles is now transcended by the Thirlmere aqueduct, which has a course of 96 miles; and, like its predecessor, is a marvel of engineering skill, passing under and over railways and rivers, crossing valleys, and piercing hills, on its long journey from the lake to the city. The immediate result is a supply of 10 million gallons per day, capable of being developed into 50 million gallons by the laying of additional pipes. Independently of the Thirlmere water, Manchester has a supply of 25 million gallons per day from the old works; so that the entire daily volume now becomes 35 million gallons, with the prospect of increasing to 75 millions. The cost already incurred in the Thirlmere undertaking is set at £2,500,000; and in order to obtain the entire supply of 50 million gallons per day, a further outlay will be required, making up a total of £6,500,000. The costly nature of the undertaking will appear when we consider that London has a supply verging on 200 million gallons per day, obtained by a capital expenditure of less than £16,000,000. Thus the London supply is nearly four times the maximum of Thirlmere, while the outlay is far less than threefold. Moreover, the future expenditure on Thirlmere is a matter of estimate, and may therefore prove greater than is expected. At present the only gain in the supply is 10 million gallons per day; whereas one of the Metropolitan Companies—the East London—supplied nearly 44 million gallons per day on an average throughout the past year. Of course, the purchase-money which equity would require for the buying-up of the London Companies would exceed the original amount of the capital, and would have regard to the commercial value of the undertakings; but the example of Manchester may be instructive to those who think it is an easy matter to bring water to London from the mountain ranges of England or Wales. It must also be borne in mind that at least thirty years before the Thirlmere scheme was entered upon, Manchester had taken over the existing water-works; considerable extensions being subsequently made. Thus Manchester purchased the old stock and added to it, before thinking of introducing the new.

Much is now being said, and more will follow, as to the superior character of a supply taken from a source situated in an uninhabited district. Regret has been expressed at the absorption of remote watersheds by large towns in the Midlands and the North. But the subject is not a new one. The Royal Commission of 1866 went into it thoroughly. Its members heard what Mr. Bateman had to say as to the head waters of the Severn, including the Vyrnwy. Mr. Fulton also came forward with a project connected with the Upper Wye. Messrs. Hemans and Hassard proposed Thirlmere; and Mr. Remington advocated a supply from the hills of Derbyshire. At that date there was the example of Glasgow, supplied since 1859 from Loch Katrine, by means of a conduit 35 miles in length. But the Commissioners were not satisfied that any project of this description could be advantageously adopted in the case of the Metropolis. There was one serious objection which may be said to receive support even in the case of the present Thirlmere enterprise. Thus we are told how perfect are the precautions taken to guard against any mishap in the transmission of the supply to Manchester. "Every "possibility of accident," it is said, "has been studied, "with a view of reducing inconvenience to a mini-"mum." In another part of the description relative to the works, there is the statement that "every detail, "indeed, has been carefully worked out to meet all "emergencies." One of the conclusions arrived at by the Commissioners of 1866 in discussing the Vyrnwy and

Thirlmere proposals thus continues to hold good. It says: "Grave doubts may be entertained whether it is desirable "that the Metropolis should be dependent on one source "of supply so far removed, and which might be liable "to accidental interruption." The Manchester aqueduct is to have more than one line of pipes. But they will lie side by side, and in the event of any breakdown all may share the same fate. The contingency may never arise; yet it is among the things that are possible, and such a casualty was clearly apprehended by the members of the Duke of Richmond's Commission. At least we may say that the risk is one to be avoided, if less perilous means present themselves. The report of the recent Royal Commission repeats the recommendation that London should rely upon the stores to be found in connection with the Thames and the Lea, aided by supplies which can be taken from the chalk strata south and south-east of the Metropolis. It is also to be observed that if London is to go to mountains and moors for a supply, the distance will be greater than any of which there is yet an example.

Lass's Analysis of Metropolitan Water Companies' Accounts.—Our readers will see, by an announcement which appears in another part of the JOURNAL, that Mr. Alfred Lass, F.C.A., has issued his annual analysis of the accounts of the Metropolitan Water Companies—the statistics dealt with being for the twelve months ending Dec. 31, 1893, and March 31, 1894.

Death of Mrs. Stelfox, of Southport.—We regret to learn that Mr. J. Stelfox, the Gas Engineer and Manager to the Belfast Corporation, has suffered a bereavement in the loss of his mother, Mrs. Margaret Stelfox, of Southport. The deceased lady, who reached a very advanced age, survived her husband (the late Mr. James Stelfox) rather more than five years.

The Sale of Debenture Stock of the Crystal Palace District Gas Company.—One of the largest rooms at the Auction Mart, Tokenhouse Yard, was crowded with investors last Wednesday, when Mr. Alfred Richards offered the £15,000 of 5 per cent. perpetual debenture stock of the Crystal Palace District Gas Company which, as previously announced, he had been instructed by the Directors to submit to public competition. The stock was put up in 150 lots; and it was all disposed of in less than half an hour—10 lots being sold at £150, 11 at £150 5s., 123 at £150 10s., 1 at £150 15s., and 5 at £151. The total amount realized by the sale was £22,570.

Crowther's "Provisional Orders."—We have received from the publishers, Messrs. Jordan and Sons, a copy of the second edition of Mr. F. J. Crowther's useful little manual of the practice in reference to Provisional Orders of the Board of Trade. The author explains that his object has been to supply what may be called a "time table" of the various steps to be taken in the progress of an application for, or an opposition to an Order; and he seems to have attained his end. The arrangement of the matter has been altered in the present edition of the book, in compliance with suggestions made by persons who had used the first edition, as well as by officials of the Board. The author conveys his information very clearly; and he presents it in a convenient form. The work may be safely consulted by those who wish for guidance on the subject dealt with.

The Heating Power of Smoke.—In an article in a recent issue of the *Chemical News*, Mr. R. R. Tatlock, F.R.S.E., &c., controverts the statement that considerable loss of heating power arises from the passing away of combustible matters in smoky furnace gases. He says this may be proved in two ways: (1) By calculation of the two sources of heating power as shown by an analysis of coal or dross used for raising steam; and (2) by actual analysis of the furnace gases for combustible solids and gases. He gives an analysis of coal or dross, showing 37·63 per cent. of gas, tar, &c., and 49·97 per cent. of fixed carbon; and, calculating the relative proportions of heating power according to Playfair's well-known formula, he makes out that the gas, tar, &c., only contribute 15 per cent. of the total heat given out during combustion, while the fixed carbon produces the remainder. An analysis was made of the furnace gases evolved during the burning of the dross. In very smoky gases, the carbonic acid was found to be 5 per cent.; so that the total volume emitted from a ton of dross would be about 940,000 cubic feet, measured at the ordinary temperature and pressure. This would contain 41 lbs. of carbonaceous, and 27 lbs. of mineral matter. This would represent 1·83 per cent. of the volatile matters given in the analyses of the dross; and, calculating from this the heating power according to the Playfair formula, it only came to 0·057. This compared with the practical heating power (7·65) of the dross, showed that the solid combustible matter of the smoke could only account for the very small percentage of 0·74 of the total heating power obtainable from the coal. Mr. Tatlock considers that these results afford evidence that the loss of combustible matters in smoke is very small indeed; and he says that, in adopting methods of removing the smoke nuisance, it must be borne in mind that there is little or no gain in burning smoke, and that other methods of dealing with the problem, such as Dulier's absorption process (already noticed in the JOURNAL), ought also to be considered.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 749.)

AFTER a storm comes a calm; and so a period of extreme quiet succeeded last week the tempestuous trouble which had beset the Stock Markets in the preceding week. People wanted a little time to settle down and reflect about it; and the reflection did not dispose them towards any display of energetic speculation just yet. The tendency, however, was not unfavourable on the whole. Prices generally kept pretty firm, and in some departments even hardened a little. But altogether the business did not amount to much; and a Jewish holiday again came in to interfere with it. The settlement was the chief event; and it appeared to be light, and free from embarrassment. It provided the usual very moderate occupation for money; but the general condition of the Market remains unchanged. The Gas Market was fairly active, though perhaps scarcely so much as in the week before. Gaslights, however, underwent no abatement; the "A" being especially brisk, and in good demand. The price, too, got better as the week proceeded; and the closing quotation showed an improvement of 1¼. Some of the secured issues also realized very good figures, especially the 10 per cent. preferences; but the quotations were left unchanged. South Metropolitans again were very firm, though not much business was effected in them. The "A" was put up a couple of points; and the "C" might have been similarly treated. Hardly anything was done in Commercials; and prices are unchanged, though the old stock quotes a little higher *ex div.* The few transactions marked in Suburbans and Provincials exhibit good figures, and a rising tendency. Brentford, Brighton, and Crystal Palace are all higher. The strength displayed by the Continentals was well maintained; and Imperial rose a point. None of the other foreign undertakings presented any noteworthy feature; and the only change was a slight further reduction in Bombay. Business in the Water Companies continues extremely restricted; but all transactions marked show that high prices are easily to be obtained. The only actual change is a rise in East London.

The daily operations were: On Monday, business in Gas opened very quiet, and was sluggish all day. The tendency everywhere was favourable to improving prices; but a rise of 1 in Brighton and Hove was the only alteration noted. There was scarcely any acceleration on Tuesday, though prices *still* appeared to be hardening. Crystal Palace gained 1. Wednesday was equally quiet; and the changes effected were an advance of 1 in Imperial Continental, and a fall of ¼ in Bombay new. On Thursday, the feature was the renewed activity of Gaslight "A," which went up 1. The favourable tendency continued on Friday, when Gaslight "A" rose ½; Brentford new, 1; and South Metropolitan "A," 2. Saturday was comparatively quite brisk; and high prices ruled throughout; but quotations remained unaltered.

ELECTRIC LIGHTING MEMORANDA.

The People of Cardiff Apathetic towards Electric Lighting—The Lesson o Leeds—An Abuse of the Patent Law.

IT appears, from recent references to the subject in the local newspapers, that the Cardiff County Council are not quite happy in regard to the prospects of their electric lighting undertaking. There has been delay in getting the central station ready; but it is reported that the completion of the plant is now only a question of a week or two, when a definite start will be made with the street lighting. Meanwhile, it has transpired that only three applications for the light had been received from private consumers by the Lighting Committee up to the beginning of last week. This is a very poor look-out, inasmuch as the Committee have been proceeding on the estimate that at least from 4000 to 5000 private consumers might be depended upon to take current from the Corporation works. The apathy of the people of Cardiff in this matter is a great disappointment to the County Council, and may be cited as an illustration of the unreliability of mere estimates of the extent to which electric lighting will be patronized in a particular town. Of course, we do not suppose for a moment that the prospects of the Cardiff electric lighting scheme are so desperate as these reports would seem to indicate upon casual inspection. The truth is probably that possible users of the light in Cardiff are not troubling themselves to make application for it until they see it in use in the streets and public buildings, and that even then the local electric lighting business will require a little pushing, like every other trade. Sooner or later, if the service is good and reasonably cheap, the municipal electric lighting venture will "go" to a certain extent in Cardiff, as in other towns; but whether or not there will be found in Cardiff sufficient consumers to make it pay, is another question. In the meantime, a local newspaper sees in the absence of the anticipated rush for the new light a lesson to those members of the Corporation who a few years ago opposed the purchase of the local gas undertaking on the ground that gas as an illuminant was nearly played out. It is not, however, given to all of us to be wise, to say nothing of being wise in time;

and seeing how strong a grip the electricians had upon the Cardiff Local Authority at the time, it is not to be wondered at that the latter preferred to leave the gas-works alone. Some of them are probably by this time wishing they had acted in the same spirit in regard to the electric light.

It is to be gathered, from a laudatory notice in a local paper of the proceedings of the Yorkshire House-to-House Electricity Supply Company, Limited, that the Leeds Corporation have at length tired of their costly toy, the municipal electric lighting plant, and are about to take a supply from the Company. If the true and full story of this particular Corporation venture were published (which is not likely to happen), the Leeds ratepayers would have even less respect than they now entertain for the collective wisdom of their representatives. It cost last year close on £3500 to light the Town Hall and Municipal Buildings; and when the Corporation, frightened at the expense of the lighting, thought to economize by utilizing one of the rubbish destructors for steam raising, they found that to do so would in a very literal way be jumping out of the frying-pan into the fire. Consequently, when the local Electricity Supply Company came forward and offered to supply current for doing the same work at a charge of £2060, it is small wonder that the Corporation Electric Lighting Committee should have gladly taken the offer. Even now, after providing for incidental charges, the Town Hall lighting will cost Leeds £3383 a year. Although this is only a small apparent reduction upon the old lighting bill, it is hoped that the work will be better done, and the ratepayers will at least have the satisfaction of knowing the extent of their sacrifice on this score. The whole thing, as Mr. A. L. Steavenson, of Durham, has not failed to rub into the ratepayers' minds by means of a pointed letter to a local newspaper, is a lesson likely to be of value at a time when it is considered the correct Progressive note to cry for the municipalization of everything. He congratulates the Corporation upon getting off so cheaply; and he evidently regards as well spent the £15,000 or £20,000 which have gone in showing the City of Leeds that it is best not to dabble in electric lighting. The lesson may be good; but it will be none the less hard for those who have to pay for it.

An instructive illustration of the way in which a patent law may be abused to the detriment of a whole community is afforded by recent experience in the United States in regard to a patent electricity distribution system. It is pretty well known to most people who have acquaintance with it, that the much-vaunted American patent system is as unsatisfactory in its operation as anything of the kind in existence elsewhere. The feature of examining applications is of value mainly to the large staff of civil servants which it furnishes an excuse for employing, and to the politicians who appoint them. It is notoriously inefficient in preventing the grant of objectionable patents, or stopping litigation over patent rights; the latter being as tedious, costly, and obstructive to business in the States as it is anywhere in the world. The American electrical industries more especially have suffered greatly from the licensed appropriation by patentees of fundamental physical expedients which should never have been passed as fit subjects for patents. One of the worst examples of this class of patents involved a claim to exclusive property in any organization of conductors for distributing electricity in which the capacity of the supply conductors or feeders is less than that of the mains. An analogous case would be that of a system of gas or water distributing mains supplied by a trunk main of smaller cubical content. No one would think of patenting the latter; but as everything in the electrical industries is popularly supposed to be new, a patent was granted for the notion as applied to electric distribution, which has only just been quashed, after years of litigation, by a decision of a Judge of Appeals. It is recognized that the importance of this judgment lies not so much in its application to the case in point (although this is of serious moment), as in the part it will play in defeating a great number of even more indefensible claims of the same general character, under which the public might have been called upon to pay heavy tribute in the guise of reward to worthy inventors. It is such misapplications that bring patent laws into disrepute.

Institution of Civil Engineers.—The meetings of this Institution during the approaching session will be held in the old theatre, at No. 25, Great George Street, Westminster, notwithstanding that the library and offices have been temporarily removed, during the rebuilding of the premises, to No. 9 in the same street.

Discovery of Coal in Lancashire.—According to a report in a Midland paper, a discovery which is likely to have immense influence on the industry of Lancashire was made at Ashton-under-Lyne last Tuesday. For the past twelve months, explorations on an extensive scale have been carried on at the Ashton Moss Colliery, with a view to proving the presence in the "Great" and the "Roger" Mines on the west side, of an extensive fault which two years ago was found to have an upthrow on that side of 415 yards. The "Great" Mine has a thickness of 5 ft. 8 in.; and the "Roger" Mine, one of 4 ft. 8 in. Assuming the seams to be continuous, they, at the lowest computation, will give an addition to the available coal supply of the United Kingdom of between 60 and 70 million tons; being equal to an aggregate output of the whole of the Lancashire coal-fields for three years.

GAS ACTS FOR 1894.

We complete to-day our notice, commenced last week (p. 691), of the gas legislation of the past session.

The Edinburgh and Leith Corporation Gas (Additional Powers) Act authorizes the Edinburgh and Leith Corporations Gas Commissioners to raise an additional capital sum of £100,000; to stop up a certain street or road in the parish of South Leith and appropriate the site; and to construct additional gas-works. An agreement for the purchase of certain lands is confirmed; and power is given for the making of a new road. The Commissioners are also authorized to borrow in any year such money as may be necessary to defray current expenses until their revenues shall be collected, provided that the amount so borrowed does not exceed in the whole two-thirds of the approximate revenue for the current year. The Falkirk Corporation Gas Act authorizes the Commissioners of the town to undertake the supply of gas within the burgh of Falkirk and parts of the parishes of Falkirk, Larbert, and Bothkennar, all in the county of Stirling, purchasing forthwith, before commencing to sell gas under the Act, the undertaking of the Falkirk Joint-Stock Gas Company, Limited, at a price to be ascertained under the Lands Clauses Act. Other local authorities may afterwards purchase the portions of the undertaking within their districts, upon terms to be settled in the same way. Additional gas lands are to be acquired, subject to the customary restrictions. Power is given to the Commissioners for fixing service-pipes in common-stairs, with branches for the supply of separate tenements. Twenty-candle gas is to be supplied, tested by a union-jet burner, at a price to be fixed from time to time by the Commissioners upon the basis of covering the cost of production. In default of notice of discontinuance, consumers are liable to pay for gas registered by the meter at the next usual period of registration. The Commissioners are empowered to form a reserve fund not exceeding £20,000; and, besides this, they have power to levy a gas contingent guarantee rate, if necessary. They are authorized to raise £120,000 upon the security of a mortgage of the rates and the undertaking, and also to borrow for current expenses upon the same conditions as apply to Edinburgh and Leith.

The Abertillery Local Board (Gas and Water) Act authorizes the transfer of part of the undertaking of the Brynmawr and Abertillery Gas and Water Company to the Abertillery Local Board, according to the terms of a scheduled agreement between the parties, by which the Company sell the portion of their undertaking within the district of the Local Board for £17,000, besides a sum equal to the aggregate amount of all capital expenditure properly incurred by the Company between May 10, 1893, and the date of actual transfer, and the value of the stock-in-trade and stores, including meters on hire in the district. This money is to be applied by the Company, first, in paying off all outstanding loans, and, secondly, in payment to the shareholders of the sum of £4 in respect of every £10 share, the balance (if any) to be applied in discharge of any other debts of the Company incurred on capital account, and (subject thereto) to any other capital purposes. After this transaction, the name of the Company is to be changed to that of the Brynmawr and Blaina Gas Company, with the capital reduced to £10,800. The borrowing powers of the Company are also reduced from £6500 to £3900. The Local Board are empowered to borrow £12,000, for purchasing the district portion of the gas undertaking, and £6000 for extensions—the former amount to be repaid in 45 years. The Accrington District Gas and Water Board Act constitutes and incorporates a Gas and Water Board for the Borough of Accrington and the districts of the Local Boards of Church, Clayton-le-Moors, Great Harwood, and Rishton, in Lancashire, and transfers to the Board the undertaking of the Accrington Gas and Water Works Company. The authorized capital of the Company is £390,000, consisting of £10,500 of "A," or 10 per cent. capital; £219,500 known as "B," or 8 per cent. capital; and £160,000 of "C," or 7 per cent. capital. The gas capital amounts to £106,000, consisting of £4500 of "A" capital; £95,500 of "B" capital; and £6000 of "C" capital. In addition to this, the Company have created and issued £25,000 of 5 per cent. gas debenture stock. The Company agreed to sell their undertaking upon terms set out in a scheduled agreement. The consideration for the purchase is the payment at the date of vesting of the cash sum of £5000, and the issue by the purchasing authorities of annuities of the same amount as the full "A" and "B" dividends to the registered holders of these stocks, and similar issues to the holders of paid-up "C" shares or stock; subject to stated conditions with regard to redemption. The debenture stock is taken over; but the undivided profits, as these stood for 1892, remain the property of the Company. All officers of the Company are to be taken over upon the standing terms of their engagements, and are not to be liable to removal, except for misconduct or incompetency, for four years. The purchasing authorities pay all costs as between solicitor and client. The Board are authorized to borrow £104,000 for carrying on the gas undertaking. The constitution of the Board is set out in the Act. Local authorities for outlying portions of the district of supply may purchase the distributing plant situate within their districts. The maximum price of gas is fixed at 4s. per 1000 cubic feet, subject, if the Board think fit, to discounts of 3d. per 1000 cubic feet for

quarterly consumptions of 70,000 cubic feet and under, and 6d. per 1000 feet for larger consumptions. Money borrowed for capital purposes is repayable in 60 years. Special regulations as to the sinking funds are enacted. The Board are authorized to borrow on current account such sums as they may require, not exceeding one-half of their yearly revenue. In applying the gas revenues, it is enacted that a reserve fund equal to one-tenth of the gas capital may be formed; and all surplus profit is to be applied in reducing the price of gas. Any deficiency in the gas or water revenues may be temporarily made good from the other.

The Bury Corporation Act enables the Corporation to borrow £50,000 for gas-works purposes, to be repaid in 30 years. A clause of the Act makes new gas pipes and fittings in new houses subject to inspection by an officer of the Corporation. Power of appeal to the Justices is reserved for persons aggrieved by proceedings under this clause. The Dundee Corporation Act is to provide for the constitution of the City and Royal Burgh of Dundee as a county of a city. Among other provisions, is one constituting the Town Council the Commissioners for carrying the Gas Acts into execution, in place of the Commissioners constituted by the Act of 1868. The business of the Commissioners may be transacted at the meetings of the Town Council and its Committees, with the exception that the annual general meeting of the Commissioners shall be held as heretofore. The several officers of the Gas Commissioners are continued in their positions, with the exception that the separate office of Clerk to the Gas Commissioners is abolished; the duties being transferred to the Town Clerk. Under their Acts, the Gas Commissioners had power to borrow money by creating debenture stock; but it was not required that any resolution for creating or issuing such debenture stock should specify that it should be redeemable. Consequently, all stock hitherto created and issued by the Gas Commissioners has been destitute of any such provision. It is now enacted that for the future all such issues shall be redeemable at or after such a period, being not less than 20 nor more than 60 years, as the Commissioners shall resolve at the time of issue.

The Kendal Corporation Gas and Water Act authorizes the transfer of the undertaking of the Kendal Union Gas and Water Company to the Corporation, upon terms set forth in a scheduled agreement. The purchase money is stated in this agreement at £80,000, besides which all the Company's debts and liabilities are assumed by the Corporation. The Company are to apportion the purchase money in paying the sum of £14,820, or £39 per share, as the price of the interest of the holders of the 380 preference shares of the Company; and £65,175, or £21 14s. 6d. per share, to the holders of the 3000 ordinary shares of the Company. The sale or purchase is antedated to June 30, 1893, but is to be reckoned as completed upon June 30, 1894, or one month after the Act received the Royal Assent "whichever shall last happen." As from the date first named the undertaking is deemed to have been carried on by the Company for the benefit of the Corporation; but with liberty to the Company to pay to shareholders their yearly dividends of 7½ per cent. on the 380 preference shares of £20 each, and 6 per cent. on the 3000 ordinary shares of £10 each, and also on completion to distribute a further sum to be provided by the Corporation equal to interest from June 30, 1894, to the date of completion, calculated at the rate of 4 per cent. per annum upon the purchase price of £80,000. The Corporation also pay £350 towards the costs of the agreement. Of the purchase money paid for the undertaking, the sum of £48,443 is allocated to the gas portion. The Company's mortgage debt, amounting to £5350, is taken over by the Corporation. Local authorities for outlying portions of the district of supply may purchase their local distributing plant. The maximum price of gas is fixed at 4s. 6d. per 1000 cubic feet; and the illuminating power at 15 candles, tested on the works. The Corporation are authorized to borrow £90,200 for the purchase of the undertaking, and £21,000 for the extension and improvement of the gas-works, to be paid off in 50 years. Surplus gas profits may be carried to the district fund. The Millom Local Board Act extends the limits of supply of gas defined by the Act of 1875 to include the townships of Millom Above and Thwaites, and also the parish of Whicham, in Cumberland. The borrowing powers conferred on the Local Board by the Act of 1875 are made applicable to the purposes of the present Act. All moneys borrowed under the Act for purposes other than defraying the cost thereof are to be repaid in 30 years, and the cost of the Act within 10 years. The Board may pay off loans either by equal yearly or half-yearly instalments of principal, or principal and interest combined, or by a sinking fund calculated to accumulate after the rate of 3 per cent. per annum compound interest. It is stated that, during the years 1877 and 1878, the Local Board borrowed under the Act 1875 sums amounting in the aggregate to £20,000 for gas and water purposes, to which an amount of £17,970 was added between 1878 and 1891, whereof a balance of £12,147 now remains outstanding. Under the Act of 1875, all moneys borrowed under it were (irrespectively of the dates of borrowing) to be paid off within 30 years, reckoned from the transfer of the gas and water undertakings from the Millom Gas and Water Company to the Local Board, which took place in 1877. As regards the outstanding balance already mentioned, the repayment is now altered so as to be completed in 30 years after the passing of the present Act. Henceforward, all moneys raised under the Act of 1875 are to be repaid within 30 years from the date of borrowing. The Gloucester Corporation Act contains a clause extending the districts of the Suburbs Lighting Commissioners, so as to include the area surrounding the city and situate within two miles of the present city boundary.

NOTES.

The Sulphur Purification of Petroleum.

It is reported that at the Standard Oil Company's new refinery at Whiting, near Chicago, the crude petroleum of Lima, Ohio, which was formerly used only as fuel, on account of the disagreeable odour and the sulphur gases evolved in burning rendering it unfit for illuminating purposes, is now refined by methods which destroy the sulphur compounds, leaving the hydrocarbons unaltered. These oils are very variable in composition, while they contain, on an average, 0·65 per cent. of sulphur. Two processes of desulphurization are employed, both being based upon the use of cupric oxide as a desulphurizer—a method adopted in France for desulphurizing glycerine in the Marseilles soap factories. In the first method, the crude oil is distilled without reagents; the oil vapours from the still being passed into vessels containing cuprous oxide, where the sulphur is separated out as cuprous sulphate. In the second method, which, in spite of its involving a double operation, is becoming pretty general, the first distillation is conducted in the ordinary way; the lighter products, spirit, and burning oil, being kept apart, and subsequently transferred to another still provided with a stirring apparatus, in which they are heated with finely divided oxide of copper—the contents being kept intimately mixed by the agitator. This second distillate is perfectly free from sulphur. In conducting the operation, it is necessary to use a large excess of cupric oxide, otherwise the pipes of the still are rapidly corroded. The residue in the still consists of a mixture of tar and cuprous sulphide. It is drained and finally squeezed in a press. The pressed cake is broken up and heated in an inclined cylindrical furnace lined with fire-brick, with a fireplace at the lower end. Heat just sufficient to start the combustion of the mass is applied, and the oxidation of the sulphur does the rest; the ultimate residue being a finely-divided powder of cupric oxide, which is returned for use in the refinery after being dried in thin layers under sheds in the open air.

Fusible Tests for Furnace Heats.

The use of vitrifiable test-pieces for the determination of high temperatures, introduced by the late Professor H. Seger, has been found to be of great value in certain manufactures where heats higher than the melting-point of common metals have to be measured. The substances used for this purpose are analogous in composition to porcelain glazes—containing silica, alumina, ferric oxide, lime, and potash in varying proportions; the mixtures becoming more refractory as the proportion of silica is increased. The different ingredients are incorporated into a paste, and moulded into the shape of small taper cones, having impressed upon one side a number corresponding to the composition. When required for use, a series of these cones are placed upon a fire-tile, and introduced into the furnace. The test-piece is considered melted when it is softened so much that the point bends over and touches the surface of the tile. The standard mixture (No. 1 of the scale) melts at 1150° C., while No. 20 melts at 1700° C., which is near the melting-point of platinum; thus giving a difference of 28·9° C. between the successive numbers. Until recently, the extension of the scale downwards had not been satisfactory effected; but this has now been done by Herr E. Cramer, who has produced a glass melting at 960° C., and capable of forming a series by admixture with the standard composition. These test-pieces, are likely to be useful in experiments to determine the distribution of heat in retort-settings, as they are handier than any form of calorimeter or pyrometer.

Heating by Combustion and by Electricity.

Herr A. Wilkie discusses certain experiments made by Mr. J. L. Roberts with the object of ascertaining the comparative efficiency of heating by electricity and by combustion. Mr. Roberts heated masses of metal (rods of platinum and iron) to a red heat, first by combustion methods, and then by the electric current. When the substance was heated by a flame, the energy expended was calculated from the loss of weight of the combustible and the corresponding calorific power; when electrical energy was used, the energy expended was calculated from the current and voltage. In the first series of experiments, a platinum rod was heated in the flame of a spirit-lamp, and also by passing a current through it. When red hot, it was dropped into water. The results showed that less than 0·5 per cent. of the thermal energy produced in the flame was transferred to the bar, whereas 90 per cent. of the electrical energy appeared as heat. In the second series of experiments, an iron bar weighing about a kilogramme was heated, first by means of well-dried charcoal, and then electrically. In the former case, about 0·75 per cent. of the thermal energy was transferred to the bar, in the latter case 88 per cent. was thus accounted for. These experiments are admittedly crude; but

they show sufficiently well that for some purposes electrical heating has claims to consideration.

The Composition of Natural Gas.

Reporting on the composition of natural gas as found in certain American States and in Russia, Mr. F. C. Phillips states that hydrogen, carbon monoxide, the olefines, and sulphur compounds are generally absent, while ammonia was only found in one instance. Nitrogen and carbon dioxide are probably always present. The paraffins are mostly methane. The author has a theory of the formation of natural gas, based upon the observation that in the decay of vegetable matter under water, after the first somewhat sudden and tumultuous evolution of gas, the vegetable tissues relapse into an extremely slow and long-continued process of decay. This process may, as he shows, be artificially initiated, and, as he maintains, is the only one known which yields gas at all similar in composition to that found in Nature. The hypothesis of Mendeléef is objected to, mainly on the grounds that no free hydrogen is found in natural gas, though this would be the case if it were the product of superheated steam acting upon metallic carbides. Moreover, natural gas contains neither olefines nor carbon monoxide; yet paraffins alone cannot be produced by any known method of reacting upon iron carbide with steam. With regard to Engler's hypothesis also, which derives natural gas from the decomposition of fish oil, Mr. Phillips objects that chemically the gases obtained by Engler by distilling fish oil and oleic acid are very different from natural gas.

Russian Petroleum and Solar Distillate.

Reporting on the present state of the petroleum industry for the French Chemical Society, M. de Boissieu says that ordinary Baku crude oil has a specific gravity of ·868 to ·865, a flash-point of 35° to 45°, and a firing point of 45° to 57°. It is separated at the first distillation into seven fractions. Of these the first is spirit; the second, kerosenes; the third, the "solar oils" so much used in gas making; and the seventh, tar or astatki. The solar oils are generally mixed with the astatki to make liquid fuel. The former has a specific gravity of between ·860 and ·875, and a flash-point above 100°. It is specially suited for gasmaking by reason of its high content of aromatic hydrocarbons. This fraction constitutes from 15 to 18 per cent. of the production. The distillation is now carried on by a continuous process. Several attempts have been made to manufacture benzene, anthracene, and other aromatic hydrocarbons, from Baku petroleum; and the author himself conducted experiments in 1891, at St. Denis, whereby he was able to show a production of 80 per cent. benzene; but the heavy fall in the price of this commodity, and the anticipation of further reductions in its value, deprives this work of the commercial importance it would otherwise have had.

Gas v. Oil for Railway Carriage Lighting.—For lighting their carriages, the Indian railways seem to have very fully adopted the Pintsch system of gas lighting. In 1893, on the East Indian Railway, 56 out of 180 vehicles were fitted with gas-lamps on this system. On the Indian Midland Railway, sanction has been received for lighting 225 carriages by this method; and a few carriages on the Great Indian Peninsula Railway have also been fitted with the necessary apparatus for the system. Sanction was given during the year for the substitution, in the carriages of the Bombay, Baroda, and Central India Railway, of Pintsch's gas system for oil lighting. On the Madras Railway, the estimate of the gas plant and fittings was sanctioned at the close of last year. This system of lighting costs so much less than the old oil-lamps, that the Government of India have ordered arrangements to be made to introduce the compressed gas system on State lines to the standard gauge, as soon as funds are available.

The Detection of Molecular Changes in Metals.—What is called a new branch of metallurgical science has, says the *Engineer*, just been opened up in France, which is likely to have an important influence upon the iron and steel industry in that country. The discovery is due to the researches of the Commission formed in 1891 by the French Government with a view of determining upon some more accurate method of testing constructive material than existed at that time in France, and to the absence of which was attributed, however groundlessly, the failures of important bridge and other works that had become unpleasantly frequent. A report on the inquiry of the Commission has just been drawn up by MM. L. Baclé and Debray, who set forth results that are considered by them, and by those who thought the Commission necessary, to be of the greatest value to the metallurgical industry. By the aid of a microscope, it is said to be found possible to detect molecular changes in metals that vary according to the constituents of which they are composed. The changes of appearance are of almost infinite variety; and each is said to show accurately the presence of certain elements, some of which may be in such small quantities as to be undetected by chemical analysis. The value of this new science of "Metallography," as it is called, lies particularly in the fact that it will allow of the most delicate alloys being made; and it opens up a very wide field for metallurgical research.

TECHNICAL RECORD.

PHOTOGRAPHY BY INCANDESCENT GAS-LIGHT.

The application of the incandescent gas-light to photography is exciting considerable interest among professional workers in that art, on account of its simplicity and economy and general adaptability where the electric light cannot be obtained. The originator of the arrangement to which reference was made in a "Note" in last week's issue (Mr. C. F. Treble) does not, it is understood, claim for the incandescent gas-light that it has so wide a range in its utility in photography as the electric light; but to the extent to which it can be applied, the results obtained are equal to those which are realized by its older rival in this field. There is no lack of evidence of this in the exhibition of the work done by the aid of artificial light now being held at the office of the *Photogram*, in Farringdon Avenue; and one of the most striking specimens of the incandescent gas-light productions is a life-like portrait—a bromide enlargement from a half-plate negative—of the Manager of the Incandescent Gas-Light Company (Mr. Julius Moeller).

Next to the quality of the results, comes the important point of economy. In the class of work in which the incandescent gas-light can be used, there is a great saving in cost in comparison with the electric light; and this will especially commend the system to photographers in a small way of business in suburban and provincial towns. The first cost is much less than an electric light installation for portraiture; and the working expense, even when constantly running the seventeen lights used by Mr. Treble, is very modest. The consumption of gas by each light is 4 cubic feet per hour, or for the whole number 68 cubic feet; and after an experience of several months—both experimental and practical—Mr. Treble is able to fix the outside cost per hour at 3½d.

The installation on the plan designed by that gentleman as exhibited in Farringdon Avenue consists of seventeen lamps, eleven of which are placed in three tiers on the left-hand side of the "sitter" and six top lights in front; the latter being of material assistance in relieving the shadows. The sitter is surrounded on three sides by white screens; the one on the side on which the lights are fixed (as well as a small strip before the top lights) being made semi-transparent by waxing the surface. In this way the light is rendered very soft and mellow; and consequently it does not dazzle the sitter. A longer exposure of the plates, however, is needed than with other systems; and this, we fear, will restrict the new-comer to adult subjects. But Mr. Treble (who is a professional photographer of wide experience and repute) asserts that this longer exposure, aided by the reflecting-sheets, considerably lightens the shadows, and so conduces to the production of first-class work. A demonstration of the system was given by him with the installation already described last Thursday evening before a number of gentlemen interested in photography. The exposure then given to the plates was eleven seconds; but, of course, with this temporary installation, the conditions are not so favourable as obtains in Mr. Treble's private studio, in which six seconds suffice. There does not appear to be much hope that this shorter exposure will be improved upon, as the plates employed at the demonstration, under the eleven seconds' exposure, were "rapids"—a term which will convey its own meaning to the uninitiated in the photographic art. However, the results were good; and judging from the appearance of the negatives—the detail in which was sharp and well-defined—they do not require more "re-touching" than those produced by ordinary work in daylight.

The system, as will be gathered from the foregoing, will unquestionably be a very useful one; but we believe it will have to be confined to studio work with adult subjects and groups of not more than two or three. The comfort of the subjects will also have to be studied by the provision of adequate ventilation, because it is needless to say except to call attention to the point, that the heat emitted by seventeen incandescent lamps fixed in close proximity to the sitter in a small studio could hardly be endured.

CARBURETTING BY BENZOL.

In a paper presented to the German Association of Gas and Water Engineers, Dr. E. Schilling has recently discussed the subject of carburetting. He gives the results of a practical application of Dr. Bunte's suggestions at the Munich Gas-Works,* some particulars of which have already been presented by Herr Ries.† His paper appeared *in extenso* in the *Journal für Gasbeleuchtung* for the 20th ult., from which the following abstract translation has been prepared.

Carburetting by benzol has now been adopted, to the exclusion of any other method of enrichment, at both the Munich works; and for six weeks no cannel has been used at either of them. Details of the apparatus itself, which has undergone

*See JOURNAL, Vol. LXII., p. 717, and Vol. LXIII., p. 484.

† *Ibid.*, Vol. LXIII., p. 197.

considerable modification since the introduction of the method, cannot yet be made public; but its construction is now such that no further obstacle is presented to the general adoption of carburetting on the score of appliances. The standard illuminating power of gas is seldom more than 4 or 5 candles above that of the unenriched coal gas; and such an accession is readily obtained by the use of benzol in the cold. From the results of the earlier experiments, since confirmed, it is found that from 7 to 9 grains of benzol impart this additional candle power to a cubic foot of unenriched coal gas. Since it requires nearly 51 grains of benzol to saturate a cubic foot of gas at 0° C., it would apparently suffice to spray the requisite amount of benzol into the stream of gas at the ordinary temperature. But it is more advantageous in practice to carburet only a portion of the gas; making that portion, however, sufficiently rich to raise the bulk by the required degree. Under favourable conditions, when the largest possible surface wetted with benzol is offered to the gas, the bye-stream may become completely saturated with the vapour. The quantity of benzol taken up is evidently dependent on its vapour tension, and therefore on the temperature.

Assuming that a cubic foot of coal gas contains 17·5 grains of benzol, this volume theoretically can further take up, at 0° C., 33·5 grains; at 20° C., 134 grains; and at 25° C., 175 grains. It is apparent, from these figures, that it is advantageous to carburet at the higher temperatures; and in Munich the apparatus is maintained at from 20° to 25° C. Compactness of plant is thus secured; and an equal degree of saturation of the gas is guaranteed through all seasons of the year. Further, without external application of heat, a considerable fall of temperature would take place owing to the heat absorbed in the vaporization of the benzol. According to Regnault's formula, the evaporation of 1 kilogramme of benzene at 20° C. absorbs 113·8 calories; and therefore the evaporation of the quantity of benzene necessary to raise 1000 cubic feet of gas 4 or 5 candles in illuminating power would absorb from 51 to 64 calories. By the application of the proper degree of heat, the bye-stream of gas may be saturated at any desired temperature. Almost perfect saturation may be attained, even with the present imperfect apparatus. During 25 days with a mean temperature of 21° C., on the average 76 per cent. of the quantity theoretically needed to saturate the gas was taken up by it. It may be deduced from the figures given that only from 1-14th to 1-11th of the gas need be saturated with benzol vapour at the above-named temperature, in order to raise the illuminating power of the whole volume by 4 or 5 candles.

It may now be asserted that there is no real obstacle to the general use of carburetting, and that only small constructive details have still to be mastered. By a thoughtful arrangement of the apparatus, security from fire and explosions is attained; and the working is throughout completely under control, and needs little attention. Some advantages of a general adoption of carburetting may be enumerated. The coke does not suffer deterioration from admixture with the indifferent coke from cannel; the tar is purer, and more free from paraffins when cannel is not used; the gas usually contains less sulphur, and is consequently more easily purified; and the enrichment is effected with the greatest simplicity and precision. Carburetting prevents stoppages in mains due to deposits of naphthalene. There is no ground for fear that the enrichment by benzol is not of a permanent character. Since carburetting has been adopted at Munich, the town tests of illuminating power have agreed more closely with those made on the works than formerly.

An indirect advantage of carburetting is the wider choice of raw material open to the gas manufacturer. Herr Ries has already published a formula by which comparison can readily be made between the cost of enrichment by carburetting and by cannel at different prices of benzol and cannel coal. The use of benzol for enriching purposes would relieve the market of the surplus production of this material; and gas-works adopting it would thereby indirectly benefit themselves in the improved value of tar.

Mr. W. Whatmough, the Manager of the Heywood Corporation Gas-Works, is to have his salary raised to £210 per annum. The Council approved of the advance last Thursday, when it was stated that, since Mr. Whatmough has been in office, the manufacture of gas has increased from 76,000,000 to 92,865,000 feet; and the sale has augmented from 65,379,000 to 82,386,000 feet.

Society of Engineers.—Last Tuesday, the members of this Society had their final vacation excursion for the present year; the works visited being those of Messrs. Siemens Bros. and Co., at Charlton. The party, which included the President (Mr. G. A. Goodwin) and several Past-Presidents, numbered about 70; and they were accompanied by the Secretary, Mr. G. A. Pryce Cuxson. Entering first the new dynamo department, the various shops were visited in succession; the chief interest being taken in the cable-shop, where the manufacture of the deep-sea section of the third line for the Commercial Cable Company was in progress. The central power and lighting station attracted considerable attention. It contains 54 electric motors of various powers—from 40-horse down to ½-horse. The inspection terminated at the show-room, in which was seen a collection of electrical and telegraphic instruments, both historical and novel.

FUEL GASES.

In discussing the prospect of the exhaustion of natural gas, Dr. E. T. J. Jordan, of Indiana, to whose report reference was recently made in our editorial columns, offers some remarks upon the character of the artificial fuel gas which may be expected to take its place. He states that while producer gas is now largely used in metallury, its economy for this purpose is due to the utilization of the waste heat in the regenerative chambers. Such fuel gas cannot be distributed over long distances, except at an expense greater than its value as a heat-producer. In the manufacture of water gas, it is observed that coke or anthracite coal must be used; the writer asserting that no process has yet been invented whereby soft or raw bituminous coal can be utilized successfully for this purpose. So long as this is true, this gas cannot be made cheap enough to compete with direct firing with the soft coals of Ohio and Indiana. Yet Dr. Jordan thinks that a mixture of coal gas, water gas, and producer gas will be the fuel gas of the future for domestic purposes. Assuming the producer gas to be made from the native slack that lies in vast quantities round the mines, Dr. Jordan gives the following percentage composition for it:—

Carbon monoxide	22·69
Carbon dioxide	7·93
Nitrogen	61·82
Illuminating gases	3·24
Water vapour	2·16
Tarry vapours and soot	2·16

The comparative heat-values of the four known kinds of fue gas, in heat-units per pound of gas are—

Natural gas	24,175
Common coal gas	22,968
Water gas	7,060
Siemens producer gas	1,957

It has been found in practice that coal gas possesses advantages over the other gases in a way that does not appear in a theoretical calculation. Owing to the fact that it possesses more free hydrogen, it ignites at a lower temperature, which means that, other things being equal, it will give better results.

ANOTHER NON-LIGHTING-BACK GAS-BURNER.

In recent issues of the JOURNAL, we have described and illustrated two new forms of atmospheric gas-burner for which *the* very important advantage is claimed of non-liability to light-back. We have now to notice a third, which has lately been devised by the London Fire Appliance Company, of Glasgow and London, and which they are supplying with all gas-fires manufactured by them. As will be seen by the accompanying illustrations, the burner is constructed on the regenerative principle; and the patentees claim that it effectually overcomes the trouble and annoyance of lighting-back without the necessity for employing gauze in any shape or form.

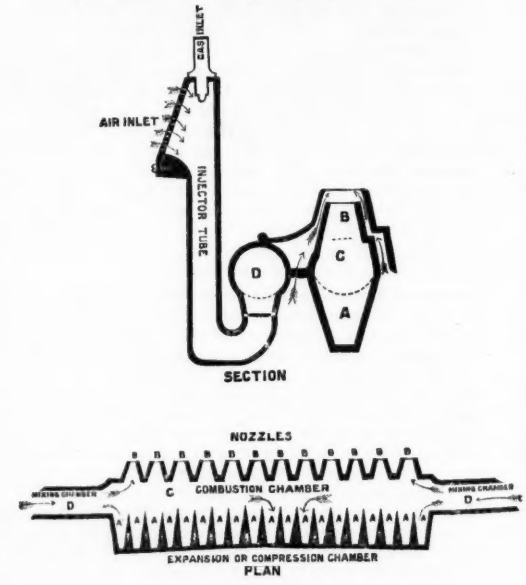

FIG. 1.

Fig. 1 is a cross section and plan of the burner. The distinctive feature in the construction of the appliance is the compression or expansion chamber A, well shown in the plan; the other parts consisting of the nozzles B, the combustion chamber C, and the injector-tube and mixing-chamber D. Users of gas-fires are well aware that, when any disturbing influence, such as down-draught, is brought to bear upon the nipples of ordinary gas-burners, the flames generally light-back, even when the gas is being supplied at a good pressure. This is due to one of two

causes—either the momentary expansion of the mixture of gas and air, or its sudden compression. In order to counteract these tendencies, the above-named Company conceived the idea of the chamber A; and they claim for it very satisfactory results. On subjecting their burner to the bellows test, the mixture is simply blown down into the chamber, thus relieving the pressure in the mixing-chamber, and permitting the gas and air to flow uninterruptedly to the nozzles. This result is due to the compression chamber being of considerably greater area than the mixing-chamber; and whether the gas is reduced at the main tap or pressure is brought to bear at the nozzles, the action is the same. The burner will work at a minimum pressure of from 1-10th to 2-10ths with perfect safety; and it is noiseless in action.

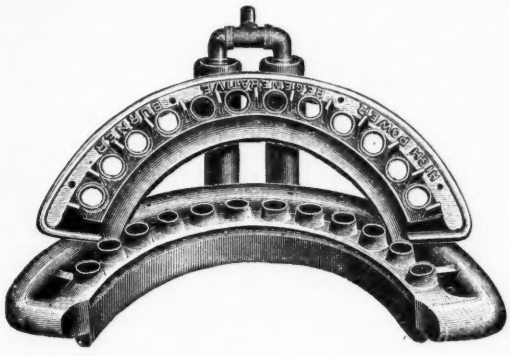

FIG. 2.

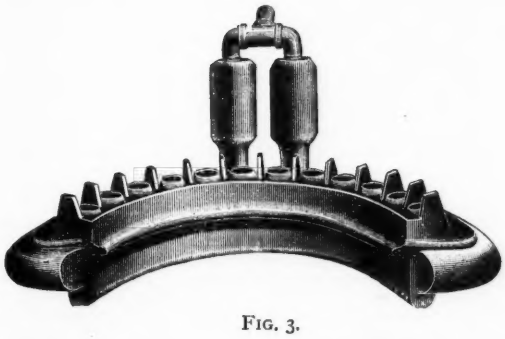

FIG. 3.

The application of the regenerative principle in the construction of the burner is a further advantage claimed for it by the patentees. On reference to figs. 2 and 3, it will be seen that the burner is fitted with a shield or cover, which forms a complete hot-air chamber. The air required to support combustion is admitted from below the burner, as indicated by the direction of the arrows in the sectional illustration. It thus impinges upon the base of the flame as it issues from the nozzles, so that perfect combustion is ensured; and it is claimed that a very much higher percentage of heat is thereby obtained from the gas consumed. The particular shape of burner here shown is intended to suit a new fire which the Company are about to introduce for the approaching season; but any shape or size of burner may be obtained.

The Welsbach Burner in France.—The vigour with which the French Incandescent Gas-Light Company have been pushing their business has not unnaturally made for them a certain number of enemies who are giving them trouble. In the first place, objection is taken to the system favoured by the Company of disposing of their burners by the aid of outside agents, rather than by people who would seem to be most suitable for the purpose—viz., those who are engaged in the management of gas undertakings, and who, moreover, have expressed a desire to take up the new light. Next, the Company have had to defend their property from the attacks of competitors. For a long time they allowed the storm to gather around them; but at last they determined to proceed against certain makers of incandescent burners, the composition of which appeared to resemble that of the material employed in the Welsbach system. Already three actions have been commenced; one being against M. Lehmann, and the others against MM. Thomas and Deselle. In view of the first-named proceedings, the whole question was thoroughly investigated by M. de Luynes, a professor at the Conservatoire des Arts et Métiers, who presented exhaustive reports thereon. Extracts from these documents occupy a very large portion of recent issues of our French contemporaries; the conclusions arrived at being that the validity of the Auer patent was not attacked by any of the prior patents cited by M. Lehmann. The Court gave judgment in accordance with these conclusions. The remaining actions will call forth reports from other experts, which it will be interesting to compare with those of M. de Luynes.

THE RECOVERY OF BYE-PRODUCTS IN THE MANUFACTURE OF COKE.

In view of the visit of the North of England Gas Managers' Association to the Malton Colliery on the 6th inst., to inspect the Simon-Carvès coke-ovens and bye-products works which have lately been erected there, the following extracts from an article in a recent number of the *Iron Age*, based on statistics collected by Mr. J. F. Wilcox, of Pittsburgh, during a visit to Europe, may not be without interest.

Very considerable difference exists between the various systems of coke-ovens used in Europe, in the quantity of bye-products obtained. The following figures are taken from the books of the companies, and, in the case of the second system in the list, immediately after the plant had been thoroughly repaired, while the Otto ovens had been running for a period of 3½ years with no repairs whatever. The coals were substantially the same, with the exception of Seibel:—

System.	Time.	Sulphate. Per Cent.	Tar Per Cent.
Otto-Hoffman	Oct., 1892, to March, 1893	1·18	3·53
Carvès-Huessener	Oct., 1892, to Feb., 1893	1·00	1·81
Semet-Solvay	Oct., 1892, to March, 1893	0·61	1·60
Seibel	Oct., 1892, to March, 1893	0·50	3·00

All the works visited in Europe claim profits and look prosperous. How these profits vary can be seen by examining the table of comparative yields. The data given below refer to the working of the Otto-Hoffman plant at No. 2 Colliery, Recklinghausen, near Bochum, Westphalia. It consists of 60 ovens and a very substantial condensation plant. As already stated, it has run 3½ years, and thus far has had no repairs. The coal is poor, as the following analysis shows: Volatile matter, 29·64 per cent.; fixed carbon, 59·35 per cent.; and ash, 10·64 per cent. The yield of coke varies from 74 to 76 per cent.; and that of breeze, 2 per cent. The coke is controlled by the mining company, who limit the time at which the ovens shall be run. If it were extended to 48 hours, the coke would be better. The charge per oven is 6·76 net tons of dry coal, which carries 12½ per cent. of water; and the average running time is 40·8 hours. The ovens, which have the standard dimensions of Westphalia, are 21·5 inches wide at the small end, and 25·3 inches wide at the large end. They are 32·8 feet long, and 5·7 feet high. The cost of labour per oven is 55·4 c.; and per net ton of coke, including superintendent and loading on the cars, 16·5 c., based on a six months' run. The number of ovens drawn was 5394; the quantity of coke produced, 19,812 tons of blast-furnace, and 5638 tons of crushed—total, 25,447 gross, and 27,992 net tons. The coal used was 36,550 net tons; the total coke produced being 76·5 per cent. The cost of labour for the six months was $2266·85; the sulphuric acid required (431 tons, at $6·8), $2930·80; and sundries amounted to $610—making a total of $5807·65. The production for the half year was as follows:—

	Tons.	Per Cent.
Sulphate	431·3	1·18
Tar	1,114·8	3·05
Pitch	173·0	0·48
Blast-furnace coke	19,812·0	54·20
Crushed coke	5,635·0	15·10
Coal equivalent of gas	4,380·0	12·00
Total	31,546·1	86·01

After heating the ovens and furnishing steam for the condensation plant, there is enough gas to develop 360-horse power, 290 of which is used by the mining company to run their washing, screening, and separating plant. There are two water-tube boilers, each of 180-horse power, similar to the Babcock and Wilcox. The average daily excess gas is 1,112,000 cubic feet. The following table gives the yield of pitch, tar, and sulphate of ammonia in the six months ending March, 1893:—

Month.	Pitch.	Tar.	Sulphate.
October	0·67	3·00	1·16
November	0·64	3·00	1·17
December	0·46	3·20	1·19
January	0·29	3·02	1·16
February	0·36	3·08	1·20
March	0·43	3·01	1·21
Benzol	0·3 to 0·7 per cent.		

The following figures give the value of the bye-products at the end of March, 1894:—

Ammonium sulphate, per pound	$0 025
Tar, per net ton	6·430
Pitch, per ton	5·140
Benzol, per gallon	0·520
Sulphuric acid, per net ton	6·800
Blast-furnace coke (oven)	2·400
Foundry coke	3·000
Crushed coke	3·150
Coking coal	1·200

The following table gives the quantity of coke produced and the number of ovens turned out in the six months:—

Dry Coal Coked. Net Tons.	Furnace Coke.	Crushed Coke. (1)	(2)	(3)	(4)	Total.	Number of Ovens Drawn
6338	3503	451	429	250	110	1240	937
5954	3456	335	478	231	104	1148	880
6074	3547	429	363	187	88	1067	889
6122	3938	368	225	151	95	839	905
5490	3300	319	319	291	107	1036	812
5568	4048	390	225	209	126	950	971

The ovens are 17 inches wide at one end, and 13·5 inches wide at the other; the length is 30 feet, and the height 5 feet. The ovens take a charge of 4·6 net tons of dry coal. The quantity of gas produced is 4,236,000 cubic feet daily. Of this, five-sevenths is used at the ovens; the excess of gas being 1,210,000 cubic feet. The power required for the condensation plant is 50-horse. The five double-cylinder boilers, of a French type, with 915 aggregate horse power, are heated by waste gas. In addition to this, some gas is used for drying the ammonium sulphate. These boilers are situated at the rolling-mill, about a quarter of a mile distant. The following are the average results for the year 1892-3:—

Number of ovens run	2716 net tons.
Running time	32·1 hours.
Charge per oven (dry coal)	4·6 net tons.
Sulphate of ammonia per month (average)	163·0 ,,
Tar per month (average)	442·6 ,,
Pitch	90·0 ,,

The following are the percentages of bye-products:—

Sulphate of ammonia	1·337 per cent.
Tar	3·540 ,,
Pitch	0·720 ,,

The profits from the condensation plant alone, including everything except taxes, were $71,450·80 for the past year. The ground is gradually settling; but no repairs in the ovens have been necessary, and no trouble has been experienced.

THE MANUFACTURE OF WATER GAS IN NEW YORK.

In a previous issue of the JOURNAL (see *ante*, p. 521), reference was made to an article by Herr Lunge on the above subject in the *Zeitschrift für Angewandte Chemie*. It contained the following particulars as to the processes of water-gas manufacture in use in New York. At the Municipal Gas-Works, the Tessié du Motay process is in operation. The plant consists of five sets of twin generators, 2·5 by 2·5 metres in section, 3·5 metres high, and charged with anthracite and coke. Air is introduced below the bars for ten minutes; and the gases so produced are allowed to escape. Steam at 200 lbs. pressure is then passed in, and the resulting water gas is led into a chamber, where it impinges against heated plates, down which a current of naphtha is flowing. In the gases thus saturated with naphtha vapours, the latter are fixed by passing through a retort raised to white heat by means of liquid fuel. The product is then cooled, scrubbed, and finally purified with lime. Ten generators and 18 sets of carburetting retorts produce in the winter season 7 million cubic feet of gas, containing 70 per cent. of water gas proper and 30 per cent. of illuminating gases derived from naphtha; and 440 lbs. of anthracite and coke, and 260 lbs. of naphtha of ·706 sp. gr., yield 10,000 cubic feet of gas of 28-candle power. Deposition of naphthalene in the pipes is prevented by passing kerosene of ·810 sp. gr. into the white-hot retorts. Lowe's process is much superior; and in it air and steam are passed alternately for a period of ten minutes through the generator charge. When blowing with air, the resulting gases are used for heating the carburettors, of which there are two in series. These are fed with a cheap crude mineral oil from Ohio. One of Lowe's cylinders measures 4 metres in diameter and 6 metres high, and supplies 1½ million cubic feet of gas in 24 hours. The gas leaves the generator at 15-candle power, and the superheater at from 28 to 30 candle power. Humphreys and Glasgow's apparatus is equally praised. It consists of two generators, two carburettors, and two superheaters. The generators are united by means of a flue, and each is also in connection with a carburettor and generator. When starting, air is blown into both generators. Steam is introduced into the superheater to the right, and after passing downward in this and upward in the carburettor, it enters the generator to the right in a superheated condition. It then passes down this and upward in the left generator; and the gas so produced entering the left carburettor, meets here four streams of oil. The gas mixture is fixed in the left superheater; and the operation is subsequently reversed.

The Purchase of the West Worthing Water-Works by the Worthing Town Council.—The Arbitrator appointed to determine the price to be paid by the Worthing Town Council for the West Worthing Water Company's works has fixed the amount at £24,590.

The Purchase of the Fareham Electric Lighting Works by the Local Board.—The Board of Trade have informed the Fareham Local Board that they will consent to the transfer to them of the Electric Lighting Company's undertaking, on being assured that the electric lines have been placed underground.

Fatality at the Worcester Gas-Works.—Henry Jones (age 40), a bricklayer of Stourport, met with a sad end at the Worcester Gas-Works between one and two o'clock on the morning of Friday, the 5th inst. It appears that deceased had no right on the works; but it is presumed that he was there in search of a job, and had climbed over the barricade with the idea of sleeping on the premises. A watchman heard a noise, about the time mentioned, as of someone falling down a pit; and, when work was resumed, it was discovered, by an employee of the contractors for the new gasholder, that Jones had fallen into an excavation some 35 feet deep, and that his body was terribly mutilated through having hit against an iron tank at the bottom. A verdict of "Accidental death" was returned at the coroner's inquiry.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Meter System v. Inspection for Detecting Waste of Water.

SIR,—The correspondence signed "London" in your issue of Aug. 21 (p. 382) contains some mistatements which do not add to the information sought by readers of the JOURNAL. I did *not* ask, "Is the automatic flushing tank the most efficient sanitary appliance," but stated clearly that *it is not*; and I am fully aware that a proper syphon waste-preventer gives a more efficient flush. My experience is that these "monstrosities" are mostly fixed at large schools and hotels; and they consume a *considerable quantity of water more than the rate compensates for* In several growing towns, I find the practice is to fix a meter on automatic flushers, charging the water-rate as a minimum; and this is the prevailing custom in America. I am *not* an advocate for the supply of water for domestic purposes by meter. I believe those who are in favour of such a system for England are very few, and have had little experience in the distribution of water to towns. This subject has been fully discussed in the numbers of the JOURNAL dated Oct. 9 and 23, 1888, and May 28, Aug. 2, and Dec. 31, 1889.

All water-works may know as well as "London" the method of rating allowed in the several Acts of the eight London Water Companies, and that to supply by meter would require a Special Act of Parliament. But I cannot agree with "London" when he teaches that water supplied for working an automatic "monstrosity," and *paid for* by meter, will not prevent waste. Let him put a meter on one of these flushers, and the first bill rendered will stop the "automatic" immediately; and an appeal will be made to Dobbs and Co. to prove that this fitting, as well as the bath, are properly a domestic supply within the meaning of the Acts. I understand that "London" agrees to my statement that all fountains, hydraulic motors, lifts, elevators, &c., are not a source of waste, but being supplied by meter are a source of revenue, and should be greatly encouraged. I am at a loss to know why the London companies do not advocate the use of the water motor more for small powers, as these can be worked economically, even at low pressures, and would pay if let out by the companies in the same way that the gas companies let out gas-engines. This discussion is referred to in the numbers of the JOURNAL for July 20 and Oct. 26, 1886, May 1 and Aug. 9, 1887.

"London" "has found the garden hose running all night;" but he gives no remedy to prevent this waste. I do not recommend the London Police Court or the London Magistrate for dealing out justice to *any* water company; but after a night's inspection, I find four or five hose-pipes left running full bore on my list. I am entitled to ask "London" what is to be done to stop this useless waste. The waste meter is not a remedy. This wanton waste is found by the use of the stethoscope by night, and notices are sent in the morning, which is generally sufficient to repair defective pipes, &c.; but it does not stop the hose from being left running to waste.

There is very much "reminding" in the letter by "Waste Inspector;" but the statements are not so clear as one would desire. Why reduce the rate per head per day for domestic supply, by deducting 10 per cent. for *unmetered* trade supplies, and 25 per cent. for metered supplies. Is there such an anomaly anywhere but in London as *unmetered* trade supplies, for who can *judge* of the quantity of water used for trade supplies? Let us take the figures as they stand in the official report of last month, and see if there is not a great waste of water in London. The total quantity of water pumped works out as follows: Chelsea, 42·35; East London, 36·31; Grand Junction, 50·64; Kent, 31·14; Lambeth, 32·95; New River, 32·90; Southwark and Vauxhall, 38·37; and West Middlesex, 34·35. This shows that the Kent Company are doing better with their system of inspection, whatever it may be, than the New River Company with the costly plant and staff in perfect working condition.

"London" is agreed that the water-waste meter system is of no use in localizing the leaks *within the district;* he does not know whether it is No. 10 or No. 410 in the street before he inspects precisely as is done at present in every well-regulated water-works. "London" further states that diagrams taken fortnightly are quite often enough; therefore there would be a fortnight between each visit to No. 410. I fix my night inspectors exactly in the same way. Each night man has his own district; and they stethoscope the whole town within a fortnight, and continue the work with discipline. Neither inspector comes home with a clean sheet. There are constant excavations for new drains, gas-pipes, electric light mains, &c., and numerous defects in old work; so that the sinking of the trenches often breaks the lead services. If the district is tight to-day, to-morrow it may not be; and therefore we put on the inspector exactly as "London" puts on his diagram, and at one-half the cost of the waste meter system, as described in the JOURNAL for March 20, 1888 (p. 509).

As to our "inspectors having nothing to guide them," this is quite an error. We know by the diagram of the recording office gauge the working pressure of the town. If undue consumption should take place (such as a burst main or a large fire), it is recorded on the diagram; we know the time, and can judge of the extent of the variation. We have also the diagrams of pumpage *per day*, the number of houses supplied, and the population; and therefore there can be no mistake in the calculation of the consumption per head per day. My experience does not agree with "London." As stated before, I have tried the experiment more than once of stethoscoping a district, repairing all defects, and afterwards testing by meter; and have found the work to have been done well, there being no consumption or waste taking place. A man using his stethoscope in the stillness of the night will not pass over a leaky service-pipe. Whether he is working under the waste-water meter or night inspection system, the stethoscoping must be conducted similarly in both cases.

Now for "London's" comparisons. He knows full well that it is only a short time since there has been any pretence at inspection for waste with any of the London Companies; and some of them are doing nothing at present, as they find that they can pump the extra quantity required at a less cost than they could maintain the waste-water meter system. It is a fallacy to pit an elaborate, costly system against *no*

system at all. The discussion is on the *waste* meter systen *v. night* inspection for detecting waste of water. "London" knows that there is absolutely no night inspection employed by the companies he wishes to disparage; and therefore the figures are useless and misleading. "London" doubts that there are 100 towns in the United Kingdom having water-closets and baths like London, showing as good results as the New River Company. I refer him to the published statistics for evidence of the fact—such as the numerous parliamentary returns from 1880 onward; the return on Urban Water Supply; statistics by Silverthorne, Hastings, Morris, Usill Small, Nicoll, and others; and the JOURNAL for July 23, 1889. If "London" does not know the facts, he should send a circular to all the water-works of the United Kingdom, as many others have done; and he will find that there are many companies having water-closets and baths in equal proportion to London, and maintaining a very low consumption per head per day, without the aid of waste-water meters.

Your readers will come to a more decisive opinion on this question if a town with a population of 50,000 or 100,000 is taken as a basis, such as described by "Waste Detector" in the JOURNAL for Sept. 4 (p. 478). The New River Company's management is not superior to that of most other companies; and the proportion of water-closets and baths is not greater than in all well-managed towns. The sanitary laws are not carried out more fully in the New River district than at Scarborough, Bournemouth, and other health resorts, where the intermittent system is worked out. It cannot be advocated, and is not resorted to by any company until their source of supply runs short. When this is the case, it is far wiser to expend the money in new works than lay it out in a costly system of meters. "London" thinks that the quotations from most of the towns must be incorrect, because the "water is gauged." Gaugings carefully and accurately made are quite as correct as measuring the capacity of the pump barrel. It is stated in Turner and Brightmore's "Principles of Water-Works Engineering" that "the method employed in estimating the quantity of water pumped, can only be regarded as affording a rough approximation to the truth." Is the quantity of water said to be pumped by the New River Company the *exact* quantity? Is there no allowance made for slip, &c.? In addition to the gauging, there is generally fixed a nest of meters to measure the whole supply going into the town; and there are other devices in use—such as Patterson's gauge employed by the Southwark and Vauxhall Company at Nunhead to measure all the water coming through the mains; Hurtzig and Bailey's recorder, the Glenfield Recording Weir Gauge; I. H. T. Turner's differential recorder; and others. In Burton's "Water Supply of Towns" it is stated that "when water flows for some distance through an open channel, it is a comparatively easy matter to gauge it;" while Messrs. Turner and Brightmore say that "gauging by orifices is both convenient and *accurate*."

As already stated, Glasgow cannot be compared to London, unless the same means for detecting waste are employed in both cases. For many years, Glasgow encouraged waste of water, they having an over-abundant supply. Later they did not check waste; and they have only recently begun to do so, by a spasmodic effort. The consumption per head will be reduced in Glasgow when they introduce, and rigidly carry out, a *disciplined night* inspection, and undo the mischief they did in teaching the people to allow the water to run through the drains, because of an over-abundance. There are *some* houses being built in London at a rent of £25 per annum with two water-closets and a bath, with circulating hot-water apparatus; but to say this is the *practice* requires modification. It will be news to your readers to learn the progress London is making in providing dwellings at £25 per annum with all these modern requirements. I am sorry to say the health resorts to which the London folk flock are not following the lead of the New River Company's districts.

I have never *assumed* that 10 or 12 gallons per head per day is sufficient for any town, even for a domestic supply; and "London's" 20·6 gallons per head, including *unmetered* trade supplies (an anomaly), requires a considerable amount of explanation as to how it is arrived at, before it can be taken as a guide for the other mismanaged London companies. It would be interesting if your numerous readers would supply figures showing the proportion of water sold for trade supplies to be 25 per cent. of the total pumped. When I quote 20 gallons per head per day for domestic supply, it means that the *actual* meter supply is deducted; and this differs in all towns, according to the number of manufactories and workshops using water. In some towns, all the water used for flushing sewers and watering roads is measured; but what percentage would "London" allow for the towns using a company's water *without* measuring it? There is great difficulty in comparing the rates per head of different towns, leaving out of question the above, and the difference in pressure at which water is supplied.

The assertions contained in "London's" reply are *not to be found in my letter*, and therefore need no comment from me; and inasmuch as "Waste Detector" has put the case clearly in your issue of Sept. 4, "London" is now requested to "astonish" him, and not

WASTE INSPECTOR.

Sept. 18, 1894.

SIR,—I have been anxiously awaiting "London's" reply to my letter in the JOURNAL for the 4th ult. I should be pleased to adopt the waste meter system if I could be assured that it would be a benefit to the town. I have been making inquiry at some of the places which are said to be using the meters, and I find that a few superintendents have discarded them, while others have simply purchased one meter, for experiment only. If "London" cannot supply the information for which I asked in my previous letter, perhaps some other of your correspondents may desire to do so.

WASTE DETECTOR.

Oct. 9, 1894.

Water-Gas Plant for the Blackburn Gas-Works.—At the last monthly meeting of the Blackburn Town Council, a joint report by the Town Clerk and the Gas Engineer (Mr. S. R. Ogden) on the manufacture of carburetted water gas, as well as one by Messrs. Stevenson and Burstal, was considered; and it was resolved to erect a carburetted water-gas plant, capable of producing 1½ million cubic feet per diem—the Town Clerk to apply for power to borrow £12,000 for the purpose.

LEGAL INTELLIGENCE.

SHIFNAL POLICE COURT.—Friday, Oct. 5.

(*Before the Rev.* W. G. GARNETT-BOTFIELD *and other Magistrates.*)

The Shropshire County Council v. The Wolverhampton Corporation.—The Expenses Occasioned by "Extraordinary" Traffic.

This was a test case regarding the liability of the Wolverhampton Corporation to contribute to the funds of the Shropshire County Council on account of the maintenance of the main road near the Corporation water-works at Cosford. It was set forth in the summons that, having regard to the average cost of repairing the highways in the neighbourhood, extraordinary expenses, amounting to £174, had been incurred by the Council from March 25, 1893, to March 25, 1894, in repairing about 1¼ miles of the Hatton Road, leading from Shifnal to Wolverhampton. These extra expenses, it was alleged, had been caused by reason of the damage occasioned by the extraordinary traffic conducted by order of the Corporation, and consisting of a great number of carts conveying coal to the Cosford pumping-station.

Mr. A. GRAHAM appeared for the complainants; Mr. ALFRED YOUNG, for the defendants.

Mr. GRAHAM, in opening the case, said that the County Council, who were responsible for the maintenance of the main roads in the county, founded their claim against the Corporation, not upon the ground of the unusual weight in respect of the traffic they conducted, but upon the fact that it was "extraordinary." It had been decisively laid down by Lord Esher in the Court of Appeal that the law did not prohibit extraordinary traffic, but merely sought to place the cost of the damage arising from it upon the proper shoulders. His Lordship further decided that the term was intended to apply to traffic which was exceptional with regard to the quantity or quality of the material conveyed, or exceptional in the mode in which the traffic was conducted. The County Council held that the traffic in question was exceptional in the quantity and quality of the material, and was distinctly extraordinary in the mode in which the road was used, causing damage and expense. The Corporation possessed a team of five carts, which were drawn by horses over the road in question in procession four or five times a day. The consequence of going in procession was that only one portion of the road was damaged, and deep ruts were formed, as all the wheels travelled over the same ground. The expense thereby necessitated was somewhat considerable. The traffic of the Corporation over the road was greater than all the rest put together; and during the year it was estimated that 7855 tons of coal were carried by the Corporation carts over the portion of the road in respect to which the claim was made.

Mr. *A. Davis*, the County Surveyor, was called, and described the Corporation traffic, which he said had an injurious effect. He had mentioned the matter to the drivers, and asked them to distribute the traffic, instead of following one cart behind the other continuously. The repair of the road had been more expensive owing to the traffic conducted by the Corporation. The number of days on which cartage was done was 313.

Cross-examined, witness said he had been informed that the water-works were established in 1857, and had been carried on continuously from that period to the present time.

Mr. YOUNG, in addressing the Bench, said that this was a test case started by the County Council for the purpose of ascertaining the views of the Bench on the law of the matter. It was, however, probable that, whatever view they took, an appeal would be made to a higher Court. The facts of the case were common ground between the parties; but it was possible to go to a degree of absurdity in the application of the Act of 1878, which dealt with the matters of excessive weights on highways and extraordinary traffic. Some extra cost was incurred by the Corporation traffic; but that might be the case with any individual who used the road. Referring to the judgment alluded to by Mr. Graham, the learned Counsel observed that it dealt with exceptional matters; and the extraordinary traffic there concerned was the use of a traction engines and trucks loaded with bricks and the carriage of Government guns. In the present instance, it could not possibly be said that the Corporation traffic was not of the common order, seeing it had been conducted since the establishment of the water-works in 1857.

Mr. GRAHAM interposed by remarking that the Corporation traffic had not been conducted along the particular portion of the road in question for more than 16 years.

The BENCH, having conferred together, announced that they had decided that the traffic of the Corporation was "extraordinary" within the meaning of the Act of Parliament; and they would grant an adjournment until Dec. 7 for the purpose of allowing the parties to arrange terms as to the sum payable by the Corporation.

Mr. YOUNG said he understood the Magistrates had not given formal judgment, but had only expressed their opinion; and judgment would be given when the parties agreed upon an amount.

The BENCH intimated that this was so.

Mr. YOUNG remarked that he should ask for a case to be stated when the decision was given.

New Water-Works at Wotton-under-Edge.—Lord Fitzhardinge yesterday week inaugurated the new system of water supply for Wotton-under-Edge. The town has hitherto been dependent upon wells; but the desirability of an improved system has been recognized for some years; and the works now completed have been carried out by the Dursley Rural Sanitary Authority. They include the collection of sixteen springs upon the hills a couple of miles from the town, the conveyance of the water to a collecting tank, and thence to a covered reservoir of 100,000 gallons capacity, the level of which is about 250 feet above that of the town. The springs and land belonged to Lord Fitzhardinge, who gave them free of cost, and also guaranteed the contractors against any claims for compensation by tenants. The Authority had obtained powers to borrow £4000; but the cost of the works will amount to only £3800.

MISCELLANEOUS NEWS.

METROPOLIS GAS SUPPLY.

The Quality of the Gas in the Past Quarter.

The following is an abstract of the report of the Chief Gas Examiner for the Metropolis (Dr. A. W. Williamson, F.R.S.) as to the quality of the gas supplied by The Gaslight and Coke, Commercial, and South Metropolitan Companies, during the quarter ending the 30th ult.:—

I. *With respect to Illuminating Power.*—The average illuminating power, in standard sperm candles, at each of the testing-stations, was as follows:—

The Gaslight and Coke Company—	
Fenchurch Street, E.C.	16·7
Kinghorn Street, E.C.	16·6
Dorset Buildings, E.C.	16·7
Ladbroke Grove, W.	16·5
Devon's Road, E.	16·3
Carlyle Square, Chelsea, S.W.	16·1
Camden Street, N.W.	16·4
George Street, N.W.	16·2
Graham Road, E.	16·8
Kingsland Road, E.	16·6
Spring Gardens, S.W.	16·2
Grove Gardens, St. John's Wood, N.W.	16·1
Hornsey Road, N.	16·3
Lambeth Road, S.E.	16·1
Millbank Street, S.W.	16·5
Commercial Gas Company—	
Parnell Road, E.	16·2
Wellclose Square, E.	16·5
South Metropolitan Gas Company—	
Hill Street, S.E.	16·6
Bedford Road, S.W.	16·3
Stoney Lane, S.E.	16·9
Lewisham Road, S.E.	16·4
Blackfriars Road, S.E.	16·9
Burrage Road, S.E.	16·4

It will be seen, from these results, that the average illuminating power has been higher than the parliamentary standard at all the testing-stations, with the exception of the Carlyle Square, Spring Gardens, Hornsey Road, Wellclose Square, and Burrage Road stations. The minimum illuminating power has been equal to the requirements, and at some stations above them.

II. *As regards Purity.*—Sulphuretted hydrogen has not been present in the gas at any of the stations. The average amount of sulphur in other forms than this present in the gas at all the stations has been considerably less than that allowed, especially at the Millbank Street, Ladbroke Grove, Devon's Road, and Lambeth Road stations of The Gaslight and Coke Company, and the two stations of the Commercial Gas Company, where it averaged less than half the quantity permitted—viz., 17 grains. The limit was only exceeded on one occasion during the quarter—viz., at the Bedford Road station of the South Metropolitan Gas Company. Ammonia was generally present in the gas more or less frequently during the past quarter, but only in slight quantities. The limit allowed was not exceeded on any occasion.

THE PRICE OF GAS IN THE METROPOLIS.

Since the conference of vestrymen on the above subject was held at the Hammersmith Vestry Hall, the paragraph in the petition to the House of Commons setting forth the present prices charged by the Companies has been revised; and a copy in its corrected form has been furnished to us by the Hon. Secretary (Mr. W. P. Cockburn). It now reads—

That the minimum statutory candle power of gas supplied, and the present price charged by the said Gas Companies for gas supplied to the public lamps and private consumers is as follows:—

	Min. Candle Power.	Public Lamps, Per 1000 Cubic Feet.	Private Consumers, Per 1000 Cubic Feet.
Gaslight and Coke Co. (South of Thames)	16	2 3	2 4
" " " (North of Thames)	16	2 3	2 10
Commercial Gas Company	16	—*	2 7
South Metropolitan Gas Company	16	2 3†	2 4
Brentford Gas Company	14	2 9	3 1
Wandsworth Gas Company	14	—‡	2 8
Crystal Palace Gas Company	15	2 6§	2 8

* Public lamps charged £3 9s. per annum, including lighting, repairs, &c.
† Less 5 per cent. if paid within first month of the quarter (public lamps only).
‡ Public lamps charged at the rate of £3 14s. 6d. per annum, including lighting, repairs, &c.
§ Less 10 per cent. for cash (public lamps only).

CHARGES FOR GAS AND WATER.

A Comparative Statement.

An elaborate table showing the difference in the amount of the rates and other municipal charges in 54 towns in England has been compiled by the Plymouth Mercantile Association. Among the particulars given are those of the charges for gas and water; the information being accompanied in most cases by a statement as to the ownership of the means of supply of these commodities.

With regard to the price of gas, it appears that, of the towns to which the information relates, the cheapest supply is in the hands of companies. At Plymouth itself, the price is fixed by the Gas Company at 1s. 9d. per 1000 cubic feet uniformly; while the Newcastle and Gateshead Gas Company charge from 1s. 7d. to 2s. At Sunderland, the Company's price is 1s. 11d. At Halifax, Darlington, and Middlesbrough, in each of which the gas undertaking is owned by the Corporation, the price is 2s. The York Company comes next, with 2s. 2d.; and the Carlisle and Bradford Corporations follow with a charge of 2s. 3d. In three towns the consumers pay 2s. 4d.—viz., Ashton-under-Lyne (Company) and Salford and Leicester (Corporations). Both at West Bromwich and at Cheltenham—Corporation and Company respectively—the price is 2s. 4½d. The Sheffield Gas Company charge 2s. 5d., and so do the Bury Corporation. The Company at Hull have fixed a differential scale running from 2s. to 3s. per 1000 cubic feet; and at Blackpool there is almost as wide a range of prices—the lowest being 2s. 4d. and the highest 3s. The four Corporations owning the works of Lancaster, Manchester, Nottingham, and Oldham, and the South Shields Gas Company agree in charging 2s. 6d. The Rochdale and Coventry Corporations have fixed the price at 2s. 7d. The Huddersfield Corporation charge 2s. 7½d. In Bath, Bolton, Stockport, and St. Helens, the price is 2s. 8d.; the last three being Corporation owned works. The Brighton, Wolverhampton, and Northampton Companies, and the Burton-on-Trent Corporation, charge 2s. 9d.; and the Macclesfield Corporation and the Bristol and Wakefield Companies follow with 2s. 10d. The Dewsbury and Wigan Corporations have fixed the price at 2s. 11d. The Barrow-in-Furness Corporation are at one with the Bromley, Chester, and Reading Gas Companies in charging 3s. The Southport Corporation charge 3s. 1d.; the Preston Gas Company, 3s. 1½d.; and Accrington (recently transferred to the Corporation), 3s. 3½d. The price at Swansea (Company) and at Bootle is 3s. 4d. The Blackburn Corporation charge 3s. 5d.; and Norwich (Company) is the highest in the list with 3s. 8d. Altogether the price of gas in 50 towns appears in the list. In three of the towns, the charge is under 2s.; while in twenty more, of which four are supplied by Companies, it ranges from 2s. to 2s. 6d. A second group of twenty towns, including six supplied by Companies, pay from 2s. 7d. to 3s.; and the remaining seven, of which three have Company owned works, from 3s. 1d. to 3s. 8d.

Of 49 water supplies mentioned in the table, 30 are in the hands of Corporations and seven of Companies; while as to the remaining twelve the ownership is not stated. The Companies and their domestic water-rates are: Norwich, 1s. in the pound; Sunderland, 1s.; South Shields, 1s.; York, 1s.; West Bromwich, 1s. 2⅝d.; Gateshead, 1s. 3¼d.; Blackpool, 1s. 6d.; and Chester, 1s. 8d. Arranged in the same way according to the amount of the water-rate, the Corporation supplies are: Liverpool, 7½d.; Salford, 8$\frac{15}{16}$d.; Manchester, 9d.; Reading, 10½d.; Plymouth, 11d.; Barrow-in-Furness, 1s.; Bath, 1s.; Carlisle, 1s.; Preston, 1s. 0⅜d.; Swansea, 1s. 0⅝d.; Nottingham, 1s. 1d.; Wigan, 1s. 1d.; Cheltenham, 1s. 2d.; Burnley, 1s. 2d.; Dewsbury, 1s. 2d.; Wolverhampton, 1s. 3d.; Middlesbrough, 1s. 3d.; Burton-on-Trent, 1s. 3d.; Darlington, 1s. 3½d.; Bolton, 1s. 5½d.; Stockport, 1s. 6d.; Oldham, 1s. 6d.; Northampton, 1s. 6d.; Bradford, 1s. 6d.; Bury, 1s. 6d.; Halifax, 1s. 6½d.; Blackburn, 1s. 7d.; Huddersfield, 1s. 8d.; Sheffield, 1s. 8d.; Rochdale, 2s. The other towns in the list (the ownership of the water undertakings in which is not mentioned in the table, but we supply the information) are—Corporations: Brighton, 9d.; St. Helens, 10½d.; Coventry, 1s.; Leicester, 1s. 2½d.; Wakefield, 1s. 3d.; Macclesfield, 1s. 3d.; Lancaster, 1s. 4d.; Bootle, 1s. 5d.; Accrington, 1s. 11d.; and Ashton-under-Lyne, 1s. 11d Companies: Sunderland, 1s.; and Southport, 1s. 1½d.

THE QUESTION OF DIFFERENTIAL PRICES FOR GAS AT WALSALL.

The Views of the Chamber of Commerce.

At the Meeting of the Walsall Chamber of Commerce on the 1st inst.—Mr. A. W. GREATREX in the chair—an important discussion took place on the subject of the charge for gas, in view of the decision lately come to by the Town Council, as recorded in the JOURNAL for the 25th ult. (p. 610), to support a recommendation of the Gas Committee to continue the present system of a uniform price.

The CHAIRMAN informed the members of the result of the deputation to the Council; and said he was sorry the communication received from the Town Clerk did not come up to the expectations of the Chamber. They considered the report presented by the Gas Committee to the Council was very one-sided. The old argument was used therein that there had been an extra outlay of £50,000 on the gas undertaking, because Walsall was a manufacturing rather than a purely residential town. But did they not get a very good return for this outlay? He saw that what he regarded as some very foolish suggestions were made at the Council meeting, while the business side of the question had been ignored altogether. He proceeded to argue that the cost of connections and the collection of accounts in the case of small consumers entailed considerable expense; and he said it would pay the Council to meet the wishes of the large consumers, some of whom were now making their own gas, or otherwise the price would have to be raised.

Mr. T. A. HILL said, in his opinion, all the information which it was stated had been obtained on the question before them had not been given in the Gas Committee's report; and he considered, in justice to the Chamber, it should have been presented in detail. To his mind, the ratepayers, having purchased the gas undertaking, and having to bear the burden of any loss which might occur, should have their gas at as near cost price as possible; but it was the duty of the Town Council to apportion the cost fairly between them. He quoted figures to show that there were 6140 consumers of less than 25,000 cubic feet of gas, producing £7448, or at the rate of £1 3s. 8⅝d. per consumer; 590 consuming above this quantity, and less than 100,000 cubic feet, producing £21,995, or at the rate of £37 5s. 7d. per consumer; and 140 who burnt more than 100,000 cubic feet, producing £5619, or at the rate of £49 2s. 9d. per consumer. He then proceeded to say that the report stated that "the demand from manufacturers who use gas for trade purposes is more irregular than that for domestic supply." This, he said, was not borne out from inquiries he had made; and the Committee gave no figures to prove it. Manufacturers began to burn gas in winter about five, and in summer about seven o'clock; and there could

not be the difference stated. It was, he believed, a fact that the small consumer often burnt only 2s. worth of gas a quarter in the summer, which, out of an average of about 24s., would make 4s. for six months, and 20s. for the other six months. The statement that £50,000 additional outlay had been incurred for the large consumers, and that the annual cost was equivalent to nearly 2d. per 1000 cubic feet of gas sold, was, in his opinion, an exaggeration. The gas sold in 1892 was 305 million cubic feet, which at 2d. per 1000 feet was equal to £2541; whereas the Corporation could borrow money at 3 per cent., and, allowing ½ per cent. for sinking fund, this would mean £1750, or a difference of nearly £800. Dealing next with the subject of meters, he showed by figures that economy was on the side of the larger sizes, inasmuch as they would, he said, pass nearly four times as much gas, and last twice as long as smaller ones, for the same initial expenditure. As to the charging of meter-rents, he thought the Committee tried to make a point of this. But if they were charged to large consumers, they would have to be charged to small ones also; and very likely the proportion for the latter would be greater than for the former. Then as to the cost of collection. The Committee pointed out that the total office expenses in connection with collecting and keeping of the gas accounts, and including the expense of inspecting the meters, only amounted to a fraction over 1d. per 1000 cubic feet; and they said that this item was so small that it could hardly be said to materially affect the question. To prove how material this was, he quoted figures for 1892, showing a total for distribution, repairs, and management, of £3340. He said this might or might not amount to 1d. per 1000 cubic feet; but he maintained that the proper way to apportion it was to divide £3340 by the number of consumers. This worked out at 9s. 8¾d. per consumer; so that it came to this, that the man who burnt about 24s. worth of gas cost 9s. 8¾d. for distribution and management, while the man who burnt £40 worth also only cost 9s. 8¾d. So how it could be said that the small consumer of gas could be supplied as cheaply as the larger one, passed his comprehension. For each consumer, whether large or small, there had to be four meter-inspections, four accounts made out and delivered, and four accounts collected and posted in the ledger. There were about 8½ times as many small consumers as large; and therefore there would have to be 8½ times as many clerks and meter inspectors for the former as for the latter. He next pointed out that the advance to large consumers from the old figure of 2s. 1d. per 1000 cubic feet was 7d., or 28 per cent.; whereas to the small ones it was 3d. (2s. 5d. to 2s. 8d.), or only 10 per cent. It was well understood that the profits for the year ending Dec. 31, 1894, would be much larger than for the year ending in 1893, as coal was lower in price, and the coal strike would not make the same difference; and therefore it would be a fair and reasonable thing to reduce the price of gas to the large consumers in the old proportions. There was little doubt that, if it were not for the large consumers, the smaller ones would have to pay a much higher figure than 2s. 8d. (probably 3s. 6d.) per 1000 feet for their gas. He moved —"That this Chamber regrets that the Town Council has refused to reduce the price of gas to large consumers, and urges upon them further consideration before finally deciding the question."

Mr. A. W. HUTTON seconded the motion; stating that all the figures he had prepared confirmed Mr. Hill's arguments.

Mr. W. H. ROBINSON expressed the opinion that the action of the Council would certainly, in the end, be directly disadvantageous to the smaller consumers.

Mr. J. LECKIE agreed with all that had been said as to the character of the Committee's report, which he characterized as vague and fallacious. He remarked that the burden of the argument came to this—that the larger the consumption of gas, and the fewer the customers, the less profitable the gas undertaking became; and Mr. Clare rightly read its meaning when he said that the working class consumers were now, under the uniform system, paying 5d. per 1000 cubic feet more than they ought to pay. But a greater than Mr. Clare and the Committee—Mr. G. Livesey—had stated to a meeting of experts and students of gas manufacture that, notwithstanding that wages had gone up 100 per cent., and although machinery had come to their aid, he was persuaded that the reason why the gas companies had been able to go on reducing the price of gas was the enormous and continuous increase in consumption. So that the delusion of the Committee—that the bigger the demand the greater the cost of supplying gas, and the smaller the demand the cheaper the gas—was by the greatest expert condemned by experience in the great manufacturing district of South London. With all deference to Mr. Hill, he thought the motion would leave the Council free to let the question slide; whereas the strong feeling in the town was that they ought not to be content with anything but a thorough inquiry to establish the truth of their position, and then to rest satisfied with nothing less than equitable prices to different classes of consumers, according to the ascertained cost to each respectively. He would therefore move, as an amendment—"That, as the report is vague and one-sided, the matter be referred to a Sub-Committee, to ascertain all the facts bearing on the points at issue;" and when this is reported upon fully, the Council of the Chamber could deliberate on a satisfactory basis.

Mr. HILL said he was willing to withdraw his motion in favour of Mr. Leckie's amendment.

Mr. HUTTON suggested a combination of the two resolutions.

It was ultimately agreed unanimously to adopt Mr. Leckie's amendment, with the addition of the words "that this Council urges upon the Town Council further consideration before finally deciding the question."

A New Water Scheme for Kegworth.—Colonel C. H. Luard held an inquiry at Kegworth last Thursday respecting a proposal by the Shardlow Rural Sanitary Authority to borrow £4000 for the purpose of constructing water-works for Kegworth. The inhabitants have hitherto been dependent upon wells for their supply; but many of these have been condemned on account of sewage pollution. It is now proposed to purchase water from the Long Eaton Local Board; and the money to be borrowed will be required for constructing a reservoir and laying distributing-pipes in the district. Several witnesses were called in support of the application.

BRADFORD CORPORATION GAS AFFAIRS.

The Oil-Gas Experiments—Municipal Bodies and Railway Rates.

On the minutes of the Gas Committee being submitted for approval at the meeting of the Council of the County Borough of Bradford last Tuesday, Mr. W. C. Dixon drew attention to the oil-gas experiments, and said that he was not aware that the agreement contained any provision that water-gas plant should be put up. The disastrous occurrences which had attended the production of water-gas were well known. At Leeds, three men had lost their lives. The gas was one of the deadliest known; and, as far as he could learn, it was of no practical value—at any rate, it had not been proved to be of value yet. It was largely used in America; and 242 persons lost their lives through it in that country in 1892. Mr. Land referred to another matter affecting the Gas Committee. Some time ago, he said, a deputation was appointed to attend in London a conference of municipal bodies called to consider the extra charges made for carriage by railway companies. He believed the Railway and Canal Traffic Rates Amendment Act empowered traders and others who felt aggrieved under the present rate of carriage to appeal to the Local Government Board within six months of the passing of the Act. The Gas Committee, who were large buyers of coal, were affected to the extent of £1000 a year; and he would like to know whether any steps had been taken under the Act. Alderman Moulson, replying to Mr. Dixon's remarks as to the oil-gas experiments, said that so far as they had proceeded, the operations had been very successful. If the system did not commend itself to the Council, they would not be obliged to adopt it. In respect to the water-gas plant, the Gas Engineer (Mr. W. Wood) assured him that there was not the slightest fear of any accident. Mr. Dixon said that what he wanted to know was whether the Chairman knew anything about water-gas being used. What authority had Dr. Dvorkovitz for putting in a water-gas plant at all? He had not had it from the Committee. Whatever he tried, the Corporation had to take over as a portion of the concern; and he would never be a party to taking over the water-gas plant. The Town Clerk intimated that the Council could do as they pleased as to taking the plant over; and he added that on the previous Saturday he saw Mr. Wood, who, referring to these matters, told him they were going on very satisfactorily. Mr. Toothill thought the question was a very subsidiary one, and that Mr. Dixon was trying to throw dust in the eyes of the Council. In answer to Mr. Land's inquiry, the Town Clerk said that the Finance Committee appointed a deputation to act in concert with the other municipal representatives in London in regard to railway rates. The deputation had been to London a great many times; and whatever had been done, had been by general concurrence. The Bradford Corporation had contributed a sum of money towards the expenses; and he presumed that, when any information of importance was at hand, it would be laid before the Committee. Alderman Moulson, in closing the discussion, remarked that there was no intention of producing water gas. He did not know of any plant being put down, except to produce oil gas. The minutes were confirmed.

THE REDUCTIONS IN THE PRICE OF GAS AT HANLEY.

It is not often that one finds the editor of a general newspaper willingly take upon himself the duty of correcting false impressions regarding the actions of companies supplying a necessity such as gas, and disseminating information which is likely to result in a better understanding between a company and their customers; and for this reason we are pleased to reproduce a short article which appeared in the *Staffordshire Sentinel* a few days ago. It was as follows:—

An examination of the annual accounts of the British Gaslight Company throws an interesting light upon the question of a cheap gas supply in Hanley. In July last, it will be remembered, the price of gas supplied by the Company was reduced from 2s. 9d. to 2s. 6d. per 1000 cubic feet. About the same time, the electric light came into use for the illumination of the streets in the principal parts of the town. t has been generally assumed that the Company made the latest reduction in order to meet the rivalry of a new competitor. We are happy to say that the reduction, welcome in itself, whatever may have prompted it, rests upon a basis more assured than this, and one which at the same time furnishes a hopeful prospect of further reductions in the future. By the Act of Parliament under which the British Gaslight Company are formed, they are allowed to accumulate a reserve fund equal to 10 per cent. of their capital. When the outside limit of the reserve fund has been reached, the Company are then bound to assign any further profits to the benefit of the consumers. The utmost limit based on the present capital of the Company is £12,148. In consequence of the increased profits of the past year, which we are assured surpassed the anticipations of the Directors, it became apparent that the reserve fund would be increased at the end of the financial period to a sum exceeding this fixture. In point of fact, it has reached £13,121. If, therefore, compulsion was necessary to induce the Company to cheapen the price of gas, it arose not from outside competition, but the beneficent operation of the Act of Parliament which directs the Company to share their prosperity with those who are the main contributories. The community, therefore, as well as the Company, are under obligations to the skilful and prudent management of Mr. John Young, which has resulted so happily in the saving of the consumers' pockets. Successive reductions have marked Mr. Young's successful management of the works during the last nine years. The first reduction took place in 1887. Up to that time the charge per 1000 feet was 3s. 6d.; and the reduction made was to 3s. In March, 1893, a further reduction to 2s. 9d. was granted; and now, owing to the unexpected improvement in the value of residuals and the increased prices received for all kinds of bye-products, which have exceeded the hopes formed by the Directors at the beginning of the year, the late reduction to 2s. 6d. became not only possible but imperative. It is satisfactory to note that any further success that may be achieved at the gas-works

will be for the benefit of the consumer, in the orm of a further reduction in price. It is the legitimate ambition of Mr. Young, we believe, to produce good gas at the cheapest price obtainable anywhere in the United Kingdom. It is to be hoped this wish may be accomplished. It is interesting to note how the consumption of gas has increased in the community since the first reduction took place in 1887. In 1880, seven years before the reduction, the quantity sold to consumers was 135 million cubic feet. In 1887, the year in which the first reduction was made, the consumption was 148 million feet—an increase of 13 millions. Now in 1894, seven years after the reduction, the consumption is measured by 198 million feet—an increase of 50 millions. The prospect of a further increased consumption, whether in the form of a universal demand by small consumers on the "penny-in-the-slot" system, by the more general introduction of gas for heating, cooking, or manufacturing purposes is encouraging in respect that as he machinery and plant at the gas-works are sufficient for greatly ncreased production, and the maximum reserve fund has now been reached, every saving effected, or profit made, will be for the immediate and practical benefit of the consumers. The shareholders are, of course, receiving first of all full payment of the very excellent maximum dividends.

THE SOWERBY BRIDGE LOCAL BOARD AND THE EXTENSION OF THE GAS-WORKS.

A Squabble over the Wording of a Report—Suggested Resignation of the Manager.

In the JOURNAL for the 18th ult., we published a report which had been prepared by the Manager of the Sowerby Bridge Local Board Gas-Works (Mr. J. Marsland) upon the question of the extension of the gas-works. It was then intimated that some of the members of the Board, at the meeting at which the report was submitted, did not think that the phraseology was the same as that of the original; and the Clerk was instructed to copy the report from the Manager's report book, and have it printed as an addendum to the minutes for September. The usual meeting of the Board was held last Wednesday week, when, according to a report presented by the Improvement Committee, it had been found that the words "any further" had been interlined in the sentence relating to the telescoping of the gasholders in the Manager's report-book; and a somewhat heated discussion arose on the subject. It appeared that Mr. Marsland had alleged that the alteration in the report had been made at the instigation of Mr. F. Clay, the Chairman of the Committee; and this gentleman opened the discussion by giving an account of the interview which he had with Mr. Marsland at the time the alteration was made. The Manager, he said, called at his office, with regard to the purifiers and the letting of the tenders for excavating. He informed him what the Board had done, also their decision to have his report printed; and he (Mr. Clay) took the opportunity of telling him "what a fool he had been." He further told him that he was about disgusted with his repeated blunders, and asked him if, by his report, he really intended to convey the idea that he had not strongly advised the telescoping of the holder then under alteration. Mr. Marsland, in a very excited manner, expressed surprise that the report should be taken to mean that, adding that he was in favour of it from the first. He then asked how he should word the report to give it its exact meaning—in fact, he stated that he would alter anything, if only he could make it right again. He (Mr. Clay) thereupon suggested that he should bring the report-book to his office, in order that they might go through it together. This was done; but he did not know whether he or Mr. Marsland hit upon the exact words introduced, for he was in a hurry, having to go to Bradford. Mr. Marsland, however, was satisfied that, with this addition, the report read as he intended it should read. He (Mr. Clay) was surprised that some of the members should insinuate that he had some dishonourable motive in the part he had taken in the matter. His only object was to protect their Gas Manager from abuse; for he felt certain that this would follow, as it was well known that he recommended the telescoping of the holder. If the Board decided that he had been in the wrong, he should be very pleased to resign the chairmanship of the Gas Committee, which had been anything but a comfortable position for the last two or three months. He considered that their Manager had been much in the wrong. After a little discussion, Mr. Marsland was afforded an opportunity of speaking; and his version of the affair was that, at the interview, Mr. Clay wrote in the words "any further" with a lead pencil, and that he (Mr. Marsland) afterwards inked them over. The wording of the report was now exactly as he meant it. They had now three holders. A contract had been given for the work in connection with one of them; and what he intended to convey was that they should not proceed to telescope the other two. Mr. Clay denied that he wrote the words in question in the report. Mr. Marsland pointed out that the character of the writing was not his, to which Mr. Clay retorted: "Well, then, you have copied mine, that is all I can say." In reply to questions, Mr. Marsland stated that he was never even asked about telescoping the first holder, nor did he say that it would be a very good thing. Mr. Baxendale observed that the issue between the Chairman of the Gas Committee and the Manager was a serious one; but he considered that an even more serious matter was that Mr. Marsland now denied that he ever recommended any telescoping at all. As one who took a rather prominent part in the gas-works alterations, he said most distinctly, not only that the Manager most strongly recommended the telescoping of the No. 1 holder, but that he went in thoroughly and enthusiastically for it. He had told them that night that he was never asked about it. Was it reasonable, however, to suppose that the Gas Committee would endeavour to force such a thing upon him? The Manager was so directly across with members of the Board on this, as well as in other matters, that they could not possibly pass over the thing quietly. The Clerk having remarked that, if there was no motion to be moved in the matter, they had better pass on to the next business, Mr. Wilcock stated that he could not sit down and allow the matter to rest where it was. He had had some experience of Mr. Marsland, and he was going to uphold the Chairman of the Committee, because he believed that he was the more truthful of the two in the business before them. Mr. Marsland had varied in all his statements regarding the alterations at the gas-works. He, for one, did not think that the Board ought to tolerate him any longer; and he begged to move that he be requested to send in his resignation. Mr. Baxendale, in seconding the motion, remarked that it was a very painful duty to have to perform. Seeing, however, the fast and loose manner in which this gas question had been treated by the Manager, and the flat contradiction which existed between him and members of the Board on different matters, he felt compelled to discharge it, painful though it was. He did not think that any further remarks were necessary. Mr. Scholefield thought that to ask the Manager to resign was taking rather an extreme step. There was no doubt, after what they had heard, that the Manager was, to some extent, liable to censure. He held that, when he suggested the altering of his report, it was the duty of Mr. Clay to state, "We will have nothing altered." He thought that, under all the circumstances, there was some amount of consideration due to Mr. Marsland; and he moved, as an amendment, that the question stand over in its present state for a month. Mr. Wrigley seconded, stating that that evening they were a little bit excited, and in the interval they might get into a different state of mind. The amendment was carried.

THE NEW ELECTRICAL WORKS AT WORCESTER.

Inauguration of the Installation—Water as Motive Power.

Last Thursday, the electric lighting works of the Worcester Corporation were publicly opened by the Mayor (Mr. G. H. Williamson) in the presence of a large company of civic dignitaries and others interested in electrical science. A number of brakes conveyed the party to Powick, where the generating station is situated. The buildings consist of three blocks of red and yellow brick, simple in design and substantial in construction; and the central and principal one contains the dynamos and engines, supplied by the Brush Electrical Engineering Company Limited. Before inspecting the works, the Mayor was presented with a gold key, with which to open the main entrance. Inside the dynamo room, it was seen that the generating power comprises three Brush Victoria dynamos—two of 5800 watts each, and the third of 6500 watts. Endless belts connect them with three Brush compound vertical engines of 286-horse power each. In addition to the motive power of steam, that of water is requisitioned; an extension of the old mill race, fed by the Teme, supplying the requisite force through the medium of turbines, which are placed in the basement of the building. In a brief congratulatory address, the Mayor referred to the day as a memorable one in the annals of Worcester. It marked the opening, he said, of a commercial undertaking in which every ratepayer was a shareholder, and which was bound in a brief period to be a great financial success, notwithstanding the huge initial outlay of about £50,000. The Consulting Engineer (Mr. W. H. Preece) then described the works in detail. He explained that the water power would be sufficient to supply the city under ordinary conditions; and in times of heavy demand—averaging, he estimated, about four hours a day—steam might be used as an auxiliary. The Mayor then formally started the engines. The inspection of the station having been completed, the party drove to the Corporation water-works at Barbourne, three miles distant; and here the utilization of electricity as a motive power was illustrated. The current is conveyed by high-tension cables, transformed to a low tension at the point of issue, and set to drive pumping machinery. The water which is required for the supply of the higher parts of the city is pumped an altitude of 300 feet, through a 10-inch pipe 5000 yards long, at the rate of 10,000 gallons per hour. Unfortunately, the machinery was not in a sufficiently advanced stage to permit of a test; and the company had to be satisfied with an examination of the works. A return was then made to the Guildhall, where the Mayor entertained his guests at luncheon in the Council Chamber. Several speeches were delivered, among the number being one by Sir Douglas Galton, who congratulated Worcester on being the first town in the kingdom which had utilized to a considerable extent the natural advantages which lay right to her hand for the creation of motive power in the generation of electricity. The saving of fuel obtained by the use of water would enable them, he said, to supply the current at a price which would make it nearly as cheap as gas. This was a great achievement, and opened up a remarkable vista for English towns. In the afternoon, the Mayoress opened an electrical exhibition at the Public Hall; and later in the day there was a large gathering at a banquet given by the Mayor.

Dorking Gas Company.—The Directors of this Company report that the outcome of the past six months' working is a balance, after providing for the interest on the debenture stock, of £1778. They recommend the payment of dividends at the rate of 10 per cent. on the "A" and "B" shares and 7 per cent. on the "C" shares. This will absorb £813, and leave a balance of £965 to be carried forward to the next account. The amount in the previous half year was £791.

Yeovil Water Supply.—Owing to the bursting of the main which supplies the reservoir, a large number of the inhabitants of Yeovil were without water for a couple of days towards the end of August. The accident has brought home to the Corporation the necessity of providing increased storeage. At a meeting of the Town Council yesterday week, the Surveyor (Mr. Armitage) presented a report in which he said more storeage was absolutely necessary; and to what extent it should be provided would probably be governed by the cost. He advised that provision should be made for at least 2 million gallons—a quantity equal to about one week's supply at the present rate of consumption. Except that of cost, there was no reason why this quantity should not be greatly increased, as they had water in abundance to fill any reasonable-sized reservoir. By the continuance of the present hand-to-mouth policy, both the Corporation and their officials had more anxiety and responsibility than were fairly justifiable. The matter was referred to the Water Committee.

MANCHESTER CORPORATION WATER SUPPLY.

The Inauguration of the Thirlmere Works.

With befitting ceremony, the gigantic engineering works by which Manchester will obtain a supply of water from Lake Thirlmere were inaugurated on Friday and Saturday last. On the first-named day, the members of the Corporation and many invited guests travelled by special train to Windermere, from whence they continued the journey to Thirlmere by coaches, of which thirty were required to accommodate the large party. In the villages through which they passed, the heartiest goodwill was shown; and at Thirlmere a large number of the residents in the district greeted the Lord Mayor (Sir A. Marshall), Sir John Harwood, and their colleagues with expressions of cordial welcome. Immediately on their arrival, the visitors walked to the place that had been appointed for the chief event of the day. This was the castellated structure above the deep straining-well, at the bottom of which is the tunnel beginning the long aqueduct to Manchester. The Lord Mayor introduced the proceedings by a few remarks. He said that this event was unique in the history of the Manchester Corporation, and, he might say, in the history of the country. It had been his good fortune during his term of office to witness the completion of various important works—the electric light supply and the hydraulic power supply, in addition to that great enterprise the Ship Canal; and now they were met to celebrate the completion of this vast undertaking for giving an additional water supply to Manchester. In regard to this, he could not refrain from expressing his great admiration of the devotion, ability, and energy of Sir John Harwood, to whom the citizens were indebted to a degree of which few of them were aware. He asked the assembly to receive him with the honour which was his due. Sir John Harwood (who is the Chairman of the Corporation Water Committee, and has been connected with the undertaking for the past twenty years, and is the sole survivor of the Special Committee whose inquiries and exertions led to the passing of the Thirlmere Act in 1879) then rose, and was received with prolonged applause. He referred, in the course of his address, to the happy auspices under which they met, after the laborious work which they had had for many years in hand. He expressed his pleasure in being associated that day with many representative men of that charming neighbourhood, as their presence seemed to him to show that the Corporation had kept the promise they made when they first came into their midst, and that their incoming was no longer a matter of regret to anyone. He contended that, by what the Corporation had done, the riparian owners and the various industries in the locality had greatly benefited; and he ventured to say that not only had they preserved the beauties of the district, but that, in some respects, they had added to them. At the conclusion of his speech, which was full of interest, Sir John set the machinery in motion by which the water of the lake was admitted into the aqueduct, amidst the cheers of the assembly. After this the carriages were re-entered, and the party were taken, by the new road on the western side of the lake, over the embankment, which was inaugurated by Sir Bosdin Leech in a brief address; and from thence they drove to a temporary school-room, where luncheon was served. Of the subsequent toasts, the principal one was "The Water-Works Committee of the Manchester Corporation," which was proposed in eloquent terms by Canon Rawnsley, and replied to by Sir J. Harwood. Subsequently the company drove to Keswick, where the return train to Manchester was awaiting them. The celebration of the event was continued on Saturday, when the water was formally turned on in the city by Sir J. Harwood. A fountain had been erected in Albert Square, in front of the Town Hall; and it was started by him with a golden key. An immense crowd filled the square, to witness the proceedings. At three o'clock, a procession issued from the hall, headed by the Lord Mayor, who was accompanied by the aldermen and councillors, by the Mayors of Salford and many neighbouring towns, by a great number of local authorities and dignitaries, and by some hundreds of other guests. On arriving at the fountain, an elaborately illuminated address, enclosed in a substantial frame, was presented to Sir J. Harwood by his civic colleagues. In this, they expressed sincere congratulations on the completion of the Thirlmere works; and they recalled the fact that Sir John was one of the pioneers of the undertaking, and that he took part in the numerous negotiations and arrangements which were made before the Bill became law. They rejoiced that he had lived to witness the completion of the scheme, and to perform the crowning ceremony. Allusion was also made to his indomitable exertions in connection with the arrangements and contracts for the execution of the works, and to the conspicuous attention which he gave to the financial aspects of the undertaking. The address concluded with these words: "Your work—long, laborious, and anxious—has been sustained with dignity and patience, its conclusion must afford you great satisfaction; and we tender you our best thanks, coupled with the expression of our earnest wishes that you may witness during many years the continued and increasing prosperity of this great enterprise." In the course of his reply, Sir John remarked that the water in the fountain had come nearly 100 miles. He added that the Corporation had acquired the entire Thirlmere watershed, 11,000 acres in extent; and, in thus securing an unlimited supply of good and pure water, they had fulfilled what Dr. Tatham had said, when he was their Medical Officer of Health, was the condition on which he would be responsible for the health of the city.

The completion of the great scheme for the supply of water to Manchester from Thirlmere is a fitting occasion for reproducing the following particulars of the undertaking which recently appeared in *The Times*:—

The new works in connection with the introduction of the water of Thirlmere Lake for the public supply of the city of Manchester will add, as a result of 7½ years' work, to the daily supply of the city 10 million gallons; making it 35 million gallons, with the possibility of further adding, at little cost, 40 million gallons more. The source of supply hitherto has been Longdendale, where works were constructed shortly after the Manchester Corporation took over the supply in 1846; and there reservoirs have from time to time been constructed at various points and levels, to store the water gathered on a drainage area of 19,300 acres. The total area of the reservoirs is 854½ acres; and the capacity 5985 million gallons This was equal to a supply of 25 million gallons per day. But for years the average consumption has been almost as great; so that the decision to augment the supply was imperatively demanded. Parliament in 1879 passed the Bill for the carrying out of the scheme for taking the waters of Thirlmere; and work was commenced in 1886 under Mr. G. H. Hill, M.Inst.C.E., who was associated with Mr. Bateman in the Longdendale scheme, and who has been connected with several large water-works schemes in recent years; so that great experience has been brought to bear on the designing and carrying out of the undertaking.

Thirlmere is one of the less-known of the series of beautiful Cumberland lakes, haunt of artist and tourist. In its original state, it was 2¾ miles in length, with very irregular banks and bed; the area being 328¼ acres. The watershed is in the lower silurian, consisting of volcanic ash and breccia; and on either side rise great hills—Helvellyn rising on the eastern side to a height of 2600 feet above the lake. The lake lies approximately north and south; the natural flow being by the St. John's Beck towards the north. To the east of the outlet of the lake there stands sentinel the Great How, while to the west is the Ravens' Crag. Across the valley from hill to hill there has been constructed a great dam, which impounds the waters of the lake, so that ultimately the surface-level will be raised 50 ft. 9 in., submerging some 400 acres of the low-lying ground in the valley, and increasing the area of the lake from 328 to 796 acres. A little old-world church, one or two shealings, and a great stretch of the highway have disappeared in the flood of waters. But for these more modern substitutes have been provided; so that everybody concerned is satisfied. An entirely new road 5½ miles long has been cut out on the hillside along the western shore of the lake where no road existed, while on the eastern side a new road for a length of 2 miles has been laid out, in substitution for the old road; and these two highways are connected by the embankment north of the lake. Special care has been taken to provide against the water from the cascades washing away the road—bridges and culverts being constructed wherever there was evidence of a flow. There are nine bridges of from 12 to 25 feet span; and the earthenware pipes are from 9 to 24 inches.

The dam stretches from the Great How on the west to the Ravens' Crag on the east. But midway there is a small hill of exceedingly hard and close rock; and this has been used as part of the dam, which is curved to suit connection with this hill. Before starting the construction of the dam, however, it was necessary to make a new outlet for the lake, so as to admit of the course of the St. John's Beck being closed where it was to be crossed by the embankment. An arched tunnel 10 feet by 9 feet was pierced through the hill in the centre of the valley for a distance of 120 yards, and through it the water was passed to the Beck. In the future, too, the water for the stream will pass through this tunnel; and to regulate the quantity, valves have been fitted. When desirable, the water may be measured in a gauge basin specially provided. The dam is 857 feet long. Excavation was first made until the rock was found slightly under the surface, and the outside walls were proceeded with. Along the inner edge or toe of the dam, a trench 6 feet wide was sunk 4 feet to 9 feet further down than the remainder of the embankment, and filled with concrete so as to strengthen the dam. The width at the base is 50 feet at the deepest part, which is 58 feet; and the depth of water there is 52 feet. The outside wall is of red sandstone from Annan, in Dumfriesshire; while the inner or water face is of the harder stone obtained at Longridge, near Preston. Immense blocks have been used in both cases. The inner face has a batter of 1½ inches per foot, while the outer face is curved to a radius of 100 feet. As the outer walls advanced in the process of construction, the interior was filled in with concrete deposited in layers of 9 inches while large single stones, technically called "plums," weighing, as a rule, about 3½ tons, were placed as close together as possible, and bedded in mortar. At the ends, where the embankment joined the Great How, the Ravens' Crag, and the hill in the centre, the hill was stepped so as to bond with the embankment.

The width of the dam at the top is 18 ft. 6 in., so as to give a roadway 16 feet wide, the surface of which is 6 ft. 3 in. above the water-level of the lake. On either side are parapet walls. When the depth is at its maximum, there will be, in the enlarged lake, 8130 million gallons; so that by this operation the storeage capacity for Manchester is increased almost threefold. There is an enormous drainage area—about 10,000 acres—and the rainfall is equal to 100 inches per annum. These figures clearly suggest abundance; and arrangements have therefore been made to provide against the overflow of the lake. A tunnel has been pierced to the west of the dam, at the foot of the Great How; and the inlet is so placed that, when the maximum height of water is reached, the water will flow over a "swallow hole," and very rapidly find its way into St. John's Beck.

The water for Manchester is drawn off from the lake a considerable distance south of the dam. A tunnel has been driven from a valve chamber on the shore through the rock for a distance of 100 yards, terminating in a concrete-lined forebay, extending along the bed of the lake. When the full supply from Thirlmere is required, there will be a tunnel from a higher point in the side slopes of the lake discharging into the same valve chamber. This chamber is 65 feet deep; and it has been constructed for a series of valves at the bottom, and another series 32 feet from the top level in connection with the second tunnel referred to. These valves, of the ordinary type, admit or exclude water from the pipes having connection with the straining-well, through which the water passes on its way to Manchester. Hydraulic power is utilized for working these stop-valves. The hydraulic cylinder, which is 30 inches in diameter by 3 ft. 7½ in. stroke, is placed at a considerable distance down the well, close to the valves. The water for operating the cylinder is drawn from a collecting-basin, constructed at the side of a stream on the hillside, and conveyed by small pipes—the fall giving the pressure. The piston raises or lowers the stop valve-rods; but hand-screw gear has been provided.

The building which covers the valve chamber, the straining-well, and the cleansing chamber, is highly ornamental in design. The buildings are circular, one large and two small towers; the walls being constructed of "the stone of the district," which has characteristics

that endow the architecture of the Lake District with a peculiar charm. All string-courses, quoins, corbels, and copings, doors and window heads, sills and dressings are of Dumfriesshire red sandstone. The result is very effective. The depth of the wells has suggested an extensive use of glass in the roofs, which are screened in by the circular walls, so that around the buildings there are only those small windows which, with the little turrets, suit the old-time baronial style.

The straining-well is also 65 feet deep and 37 ft. 6 in. diameter at the bottom and 40 ft. 6 in. at the top. The strainers are fitted to a height of 20 feet into slots on eight cast-iron columns, and thus form an octagon. The water, entering through the pipes from the valve chamber, debouches out of a bell mouth outside of the octagonal series of strainers, and, passing through these strainers to the interior, flows thence in pipes to the aqueduct. Of course, there are provided means for cleansing the strainers and for draining the well dry; while tackle is carried on girders at the top of the building for raising any part for repairs. Every detail, indeed, has been carefully worked out to meet all emergencies.

The aqueduct is within a few yards of 96 miles in length. There are three classes of work. Tunnelling makes up a length of 14½ miles. Where the line is near the surface, trenching was excavated, and the aqueduct built of concrete in the open—the "cut-and-cover" process. This was applied over a length of 36 miles; while the remainder of the distance—upwards of 45 miles—was laid with one line of piping, of which 55,000 tons were used on the works. Where the aqueduct is in tunnel or cut-and-cover, it has been made to convey the full 50 million gallons of water per day; but as only 10 million gallons are to be passed in the immediate future, one line of piping has been laid. Ultimately there will be five lines, and all works have been constructed for this number. In the Lake District, however, the pipes are of 48 inches in diameter, so that only three will be required instead of five; each being capable of passing 24 million gallons per day. This has been adopted primarily to obviate frequent disturbance of the ground, and doubtless also for economy, since extensive work had to be carried out in the way of anchoring the pipes where the inclination was great. The route is almost direct south, through Ambleside, above Windermere, east of Kendal, Borwick, about four miles east of Lancaster, a similar distance from Preston, through Chorley, Adlington, west of Horwich and of Bolton, and south of Farnworth to the Prestwich reservoir, which is about 4¼ miles from Manchester. The latter 13 miles, through the coal district, is entirely piping. The inclination in tunnel and cut-and-cover is 20 inches to the mile; while the pipes generally have an inclination of 24 inches to the mile.

The tunnels and cut-and-cover aqueduct are 7 ft. 1 in. by 7 feet; but an extra 9 inches has been added to the height where the fall in the syphon is less than 2 feet per mile. The increase in height is necessary, as the extra depth of water banked up gives the required head to discharge the maximum quantity through the pipes. The heaviest tunnelling was in the Lake District, where the high mountain ranges had to be pierced. The longest tunnel was that through the pass of Dunmail Raise, 5186 yards in length, and the driving occupied 4½ years. The next longest was the Moor Howe tunnel, 3040 yards long; while Nab Scar was probably the highest point tunnelled—the height being 660 feet from the aqueduct level. This tunnel was 1419 yards long. The Skellgill tunnel was 1243 yards. Few of the other tunnels were of great length, and none involved any special difficulty, excepting that in the first named the alignment proved troublesome, owing to there being an angle in the line of tunnel. But so carefully were the data made by Mr. Ernest P. Hill, that the meeting—considerably beyond the angle—was only 8½ inches out; being equivalent to an error at the base of 1-80th of an inch. In a tunnel in the coal district, again, a cavity was discovered extending for about 35 yards, and varying in depth from 18 to 15 feet; clearly indicating an old coal working. This area was completely filled with concrete. It was decided that pipes should be laid in this tunnel, which is 550 yards long, and the only one in the coal district. This was done to obviate any future difficulty due to settlement, which is not infrequent in this locality.

In the Lake District there are several long syphons; that across Troutbeck being very steep, and requiring special provision to anchor the pipes down and up the slopes. The longest syphon, however, is that at the River Ribble, near Preston; the length being about 9½ miles, while the maximum pressure is 400 feet. The heaviest head, however, is immediately north of the Lure bridge, where the pipes descend a steep hill to reach the bridge carrying them over the river. The pressure is equal to about 425 feet; and here the pipes are of 1¾-inch metal and specially tied back with steel rods to great masses of concrete, the better to resist the pressure. Again, at Artlebeck, under similar conditions, the head is almost as great. The syphon over the Rivers Mint and Sprint, in the vicinity of Kendal, is 5767 yards long; while at the Beehive syphon, beyond Kendal, a very deep trench was required. In some cases, the pipes rest upon concrete or masonry; at other points the trench is completely filled with cement concrete, while at certain parts, where the ground was soft, especially in peat, it was found necessary to drive piling, across which a timber seat was provided. In quicksand, concrete pillars 3 ft. 6 in. to 6 feet deep, and 4 feet square, were made as supports.

The method of passing the water from the concrete aqueduct tunnel to the piping may be described. The water flows freely into a chamber, the floor of which is pierced by five large bell mouths, each of which passes the water in underground pipes into one of five separate wells, where also there is a bell mouth. The wall of each separate well is pierced by one of the five lines of pipes. The idea in having bell mouths is to work valves for stopping the flow of water into the pipes in the event of accident. Over the wells is a horizontal lever, which has a fixed fulcrum, and suspended to it is a large dome-shaped valve over the bell-mouth inlet; while hanging to the end of the lever, there is a copper float resting in the water in the separate chamber. Should the pipes burst, the water would instantly rush away from this separate chamber, the copper float would fall with the water-level, and therefore draw down the lever and also the dome-shaped valve, so that no water could enter the small chamber or the pipes. There are supplementary details for allowing only a small quantity of water to enter the pipes after repair, while bye-washes have been provided, so that in the event of the pipes bursting and the passage of water in the ordinary course being stopped, the water would readily pass from the chamber into the nearest stream until the valves were closed at Thirlmere. In the syphons which are specially steep there are automatic valves with beautifully balanced mechanism, so that an increase in the velocity of the water itself sets a series of levers in operation, and thus throws a disc, which is ordinarily horizontal, into a vertical position, closing the passage of the water. Any rush of water, therefore, due to breakage will at once be stopped not only at the inlet of the syphon but in the pipe itself. Heavy manual stop-valves have also been fitted at intervals; while upwards of 200 air-valves have been placed—all at summits—to allow air to escape from the pipes. It will thus be seen that every possibility of accident has been studied, with the view of reducing inconvenience to a minimum.

There are 23 bridges of various design carrying the aqueduct over rivers, streams, and railways, and in addition ten subways for the pipes passing under railways. Over the Ribble, above Preston, there is a bridge of 231 feet in length over all, and 27 ft. 3 in. wide; while over the Lune, which is crossed on the skew, the span is 350 feet. These bridges have cast-iron segmental arches with masonry piers; and the appearance is certainly handsome. The pipes are carried on cast-iron roller-carriages resting on longitudinal steel rolled joists 14 in. by 6 in.; and thus there is allowance for expansion and contraction. Semicircular steel plates cover in the pipes as a weather protection; and over all is a gangway with rails for trolleys. In other cases where the height above stream does not require to be great, as in the case of the crossing of the Mint and the Sprint, near Kendal, the pipes are simply carried on joists resting on the piers without the ornamental segment arches for additional support. The span, however, in such cases is limited. There are several masonry and concrete bridges, one over the Brownhouse stream, recalling the old Roman type, in which, in addition to the ordinary arches for each span, there is a longitudinal arch along the centre line of the bridge, rising 35 feet above the stream level. Over this again is the 7 feet arched concrete tunnel passing the water. In the Lake District are several well-proportioned arched bridges, built not only of the stone of the district, but in accordance with the prevailing architecture.

The aqueduct terminates in the new reservoir at Prestwich, adjoining one of similar capacity constructed in 1867 for supplying the higher districts of Manchester with water originally obtained in the Longdendale district. Indeed, the new reservoir has also been in use for a considerable time in the same service. This has an area of 4½ acres, and a capacity of 21 million gallons. The site is on the top of a hill; and, as an impervious foundation could not be secured for the embankment, the method of construction differs from that usually adopted. A trench 3 feet deep was dug in the centre line of the embankment, and was filled with clay; and the whole area of the reservoir was dressed and covered with a thick layer of puddle, concrete, or brickwork—methods being adopted for bonding or locking the concrete and puddle together at the foot of the embankment. The puddle wall, of course, was carried up to within a few inches of the top level of the embankment, the height of which varies from 38 feet to 8 ft. 6 in., according to the contour of the ground. The width at top is from 14 ft. to 9 ft. 6 in. The requisite valves for inlet and distribution have been fitted, and arrangements made so that the water may be passed from the aqueduct into either reservoir.

THE POSITION OF THE LEICESTER CORPORATION WATER SUPPLY.

Alderman Wood, the Chairman of the Leicester Corporation Water Committee, last week informed the consumers that the position regarding the water supply had much improved during the previous fifteen days. The water in the Bradgate reservoir had been analyzed by the Medical Officer of Health; and he found it of good quality. The water contained in the Thornton reservoir was all that could be desired. The total stock in both reservoirs was about 100 million gallons. The auxiliary supplies of Ellistown and Swithland were being well maintained; and during the preceding week yielded an average of 731,000 gallons per day. Connections had been made with several of the deep wells in the large factories; and these were beginning to augment the water supply of the town. The Bedehouse Meadow shaft had been sunk 40 feet, and was yielding a daily supply of 160,000 gallons, which was of good quality, but hard. The Committee, he also stated, were not relaxing any of their efforts to meet any difficulty that might arise in case the rainfall should not come to their assistance before the winter frosts set in; and they had in hand a scheme (which would only take a few weeks to complete) to give a daily supply of at least 500,000 gallons of good and soft water. The Committee and the Engineers are still of opinion that they will not have to place the town on any further limitation than that existing at present; and 24 hours' rainfall would justify them in increasing the hours of service. The *Leicester Journal*, of last Friday's date, states that the rainfall of the past few days has not had any appreciable effect upon the stock of water in the Corporation reservoirs; as the showers have been too intermittent and light to increase the store. "So far," our contemporary adds, "as the wells and shafts are concerned, the auxiliary supplies that have been promised from these sources will not be so readily available as official information has tended to indicate." It is no doubt the loss of a large proportion of the rainfall during the last few years that has brought about the present trouble. It is stated that out of the 10 million gallons of rain which had fallen at the reservoirs during the past 33 months, only about 2½ million gallons have been caught, while rather more than 3 million gallons of water have been consumed. Instead of getting one-third of the rainfall, only one-fourth was secured. As the rainfall cannot be increased, the only remedy for insufficient supplies is to extend the catchment area.

Extension of the Nelson Gas-Works.—The Town Clerk of Nelson is about to apply to the Local Government Board for sanction to borrow £20,000 for gas-works purposes, and for the extension of the present limits of supply.

PLYMOUTH CORPORATION WATER SUPPLY.

Payment of Interest out of Capital.

An important proposal in reference to the extensive works now in progress for improving the water supply of Plymouth was under consideration at the meeting of the Corporation of the town yesterday week. The Water Committee recommended that the interest on all money borrowed for the construction of the Burrator reservoir and other works should be charged to capital account during construction. Mr. J. T. Bond, the Chairman of the Committee, in moving the adoption of this proposal, said the matter was of vital importance to the ratepayers of the town. While the money was being spent, they were deriving no benefit from the water stored; and it was undesirable and inequitable that the ratepayers of to-day should be burdened with expenses which could not be productive until the works were finished. Until their completion, the works could not be the slightest aid to them, either in revenue or rates. There had, however, been assessed this year on the ratepayers of Plymouth the sum of £2500 to provide for the interest on the money borrowed in respect of these works. Next year, and in each succeeding year until all the works had been carried out, a like sum would be required to meet the same liability. Assuming the reservoir to be five or six years under construction, a sum of £15,000 would be required to meet the interest on the capital outlay of this period. By charging the interest to capital account, they would postpone its payment until the works were in operation; and by distributing the payment over 60 years—the term allowed by the Act for the repayment of the loans on account of these works—they would, instead of burdening themselves heavily for five years, only burden the ratepayers of the future to the extent of £500 per annum. To meet it then, they would have a larger income from the water property. For nearly 15 years the increase in the water revenue had averaged more than £400 per annum. Last year the increase was nearly £500. In five years they would probably be receiving from the water property a revenue of £2000 a year more than they obtained now. It should also be borne in mind that the rateable value of Plymouth was increasing, and £1200 now raised by a rate of 1d. in the pound would more approximately be raised by a farthing rate in the future. The principle he advocated had been adopted in connection with other local works—the Manchester Ship Canal and other important undertakings. Alderman A. S. Harris said he should not oppose the proposition; but it was well to remember that the principle of charging interest to capital account was usually adopted in connection with undertakings from which no pecuniary benefit was derived. This was so in the case of the Manchester Ship Canal. The Town Clerk remarked that it was deriving a revenue from the Bridgwater Canal. Alderman Harris said the Water Committee were deriving a large revenue from their property at the present time. Mr. T. H. Harvey pointed out that by the change proposed the Corporation would have to pay compound interest on a portion of the water-works loan, with the result that for the £15,000 they would save in the next five years the ratepayers would have to pay £30,000 spread over 60 years. Mr. Bond said the immediate effect would be to save close upon 5d. in the pound in the rates. The proposal was adopted without dissent.

In connection with the construction of the works, the Water Committee reported that they had failed to come to terms with Sir Massey Lopes, with respect to the amount to be paid for certain easements for the conduits from Burrator and for damages consequential on the exercise of the power of the Plymouth Water Act, 1893. Mr. Bond explained that Sir Massey's original claim was for £2000. After protracted negotiation between Surveyors on both sides, this was reduced to £1000. The Committee offered £800 in settlement; and this Sir Massey accepted, subject to certain restrictions as to the width of the easement and the position of the sluices. To these, the Committee consented. But a question of the payment of certain costs had arisen; and as the Committee's offer of £50 for all costs was refused, the negotiations were rendered abortive. Their statutory rights were, however, covered by the offer of £800; and the Committee were under no anxiety in regard to the matter.

The Proposed Water-Works Extensions at Nelson.—The decision of the Water Committee of the Nelson Town Council not to proceed with the construction of a new reservoir in the Ogden Valley (see *ante*, p. 662) was included in the minutes which came before the latter body at their last meeting. It appeared from the discussion that there is a serious (but as yet undiscovered) leakage of water in the town, calculated at 400,000 gallons per day; and the majority of the Committee are of opinion that, if they can ascertain the source of this waste, it will not be necessary to at present spend the money on a new reservoir. The Chairman of the Committee (Mr. Astley) strongly opposed any delay in entering upon the extension of the storeage accommodation on the ground of the rapid growth of the population and the consequent increase in the demand for water. The minutes were adopted.

The Local Government Board and Lead-Poisoning.—A communication has been received by the West Riding County Council from the Local Government Board, stating that they have had under their consideration the question of the action upon lead of water in connection with water supplies. They state, however, that they cannot undertake any special inquiry and experiments with regard to the action of lead upon water, in the case of all new schemes of water supply, as suggested by the West Riding Law and Parliamentary Committee, although they think that this is a matter which should be considered carefully in connection with new supplies, and fully realize the importance of the subject. Upon this communication the Law and Parliamentary Committee have reported that, after consultation with the West Riding Sanitary Committee, they are of opinion that the evil would be remedied by the substitution of iron pipes for lead, and have directed the West Riding Solicitor to communicate with the Local Government Board, requesting that steps may be taken to confer power on the County Council to prohibit the use of lead pipes in connection with any public supply of water, which, when in contact with lead, may cause lead-poisoning.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Though little has been heard of the Peebles oil-gas process during the past two months, it is not to be assumed that its progress, which has all along been steady, is in any degree arrested. Both Edinburgh and Glasgow are moving in the matter of adopting it in their gas-works—the former as part of their plant, and the latter as an experiment with a view to giving the process the same opportunity as has been given to the water-gas plant of Messrs. Humphreys and Glasgow of showing what it is capable of doing. It has also been introduced into the Brechin Gas-Works, where it will be under the charge of Mr. J. B. Terrace, the elder brother of Mr. Andrew Terrace, now of Blairgowrie, who worked it successfully at Lasswade. A deputation of the Edinburgh and Leith Gas Commissioners visited Peebles at the end of last week, to see at work the new oil-gas plant which Mr. Young described at the North British Association meeting in July. I understand that they were all highly pleased with it; and, as a Committee already have powers to proceed with erecting the plant, it is likely that they will now at once proceed with its introduction into the Edinburgh works.

The Corporation of Paisley are considering the propriety of erecting plant for the manufacture of water gas. A minute was submitted to the Town Council on Tuesday night, which stated that a Committee which had been appointed to investigate and report as to the manufacture of gas from oil had visited Belfast to see the water-gas plant there. In order that the introduction of water gas might be covered, they described the Belfast plant as designed for the manufacture of gas from water and oil. Nothing was done on Tuesday night, as the Committee are to bring up a report on the subject, with plans showing how the system could be adapted for Paisley, and giving an estimate of the cost. Should the Paisley Corporation adopt water gas, there will be an opportunity of comparing working results with the Peebles plant at Edinburgh. Unfortunately, the season is so far advanced that the results of a full year's working will not be available till, at least, 1896. But there should be something ready for next year's meetings.

The Hamilton Corporation have achieved the distinction, during the past six months, of having received as much for residuals as covered the cost of coal. This was brought about by a rise of 1s. 6d. per 100 gallons in the price obtained for tar and liquor, raising the return from them to 8s. per ton of coal carbonized. After allowing for stock, the yield of tar and liquor per ton of coal was 77 gallons. In addition, the sales of coke rose from 564 tons in the same months of 1893 to 1125 tons, which is attributed to the use of the setting of regenerative retorts introduced by Mr. Ewing, the Manager. Coal and shale were used, the coal being a third-class cannel; and the yield was 10,814 cubic feet of gas per ton. During the same period in 1892, 2815 tons of coal yielded 23,980,200 cubic feet of gas, 147,313 gallons of tar and liquor, and 491 tons of coke; while in the past six months the yield was, from 2457 tons of coal, 26,569,300 cubic feet of gas, 185,189 gallons of tar and liquor, and 1125 tons of coke. These results have been obtained although, on account of the strike, they had had to use coal which, to a large extent, had been exposed to the weather at pit-heads. If the advance which Mr. Ewing has succeeded in establishing in the working of the undertaking be carried much further, gas will become the secondary product and residuals the primary.

It will be learned with regret that the Gas Commissioners of Perth have resolved to relieve their veteran Manager, Mr. T. Whimster, of some of his duties, and to place them on Mr. Easson, the Sub-Manager. But, on the other hand, while there is regret that such a long, valuable, and honourable career as Mr. Whimster's should have come to the period when age necessitates a shrinkage of his position, there must be a sense of pleasure in the feeling that in his declining days he should be enabled to spend his time with greater comfort than generally pertains to the lot of the gas manager in active life. There is to be a division of duties between Mr. Whimster and Mr. Easson; and while Mr. Easson is to receive an advance in his salary, it is to be provided by Mr. Whimster. This is the least satisfactory part of the arrangement; but it is perhaps inevitable. It will, I have no doubt, be more gratifying to Mr. Whimster to be allowed to continue in office than to be retired altogether, and be condemned to absolute idleness, which would ill suit an active nature like his.

Along with this information, there comes also a proposal, which has long been in abeyance, but is now assuming an active state, for the removal of the gas-works to another site. They are in a very confined situation, forming a complete block, with consequently no room for expansion; and they are, moreover, in a densely populated district, and therefore more or less of a nuisance. As a first step in the consideration of the subject, a report on the value of the works was obtained from Mr. Whimster. It was to the effect that the valuation amounts to £63,411; that the plant in the works is nearly all new; that what is not new is as good as new; that all the large mains in the streets are either new or as good as new; and that the whole of the undertaking is up to date in the latest improvements of apparatus and in good condition and working order. It was proposed that Mr. Wright, the Convener, should bring up a report on the proposal to remove the works. One member of the Committee objected to this being done, and pointed out that during the past five years the Commissioners had expended about £10,000 on the works, knowing all the time that they would require to be removed. It was stated by someone that within three years the present works would be taxed to their utmost. There is, in this circumstance, need for the subject being looked into; and the Commissioners, realizing this, gave Mr. Wright authority to bring up a report on the subject.

As showing that the consumption of gas in Perth is on an increase so rapid that something will require to be done before long, it may be stated that Mr. Whimster's report on the quantity of gas manufactured was to the effect that during the past month the output was 7,068,900 cubic feet, as compared with 6,494,400 cubic feet in the corresponding month of last year. The illuminating power was 27·11 candles. It may also be stated that the yield from coal and tar was at the rate of 10,236 cubic feet of gas per ton of coal. This is over and above the gas produced from oil.

This is the season of the year when that weakness of representative

government, the talking of mere balderdash to the electors, is prevalent. I gave one instance last week. This week there is another. What, for instance, would your readers interpret the following sentence (which occurred in an address by ex-Bailie D. Macfarlane to the electors of Paisley on Thursday night) to mean? "He was confident that no town in Scotland gave the gas at so cheap a rate, and with the same illuminating power, as Paisley." This I have no doubt was held to mean that, relatively to the illuminating power, the gas in Paisley is cheaper than in any other town in Scotland. But he did not say that. Observe, first, Mr. Macfarlane's remark is confined to towns where the gas supply is in the hands of the corporation, because he limits it to the towns which "give" gas; but that is no matter, because I believe that the Paisley Corporation will stand comparison, in the matter of price and illuminating power, with any company. Taken for all that it is worth, the statement is simply that in no other town in Scotland is gas of the same illuminating power supplied at so cheap a rate. It is gas of "the same," not of "the same or higher" illuminating power, which he wishes a comparison made with. Excluding companies, there are only eight other places in Scotland where the same illuminating power is to be found; and there are two which profess to give higher. In all those other places the price of gas is higher than in Paisley, so that Mr. Macfarlane is right in his statement. It is only as to the interpretation which will be put upon his remark that there is any need to make reference to it. There would be no need, either, to be hypercritical as to his statement, were it not for the probability that, were he taken to task as to its meaning, he would be the first to stand upon strict interpretation. As to the price of gas in Paisley, it is undoubted that it is among the cheapest, taking illuminating power into account, in Scotland. The Corporation and their Engineer (Mr. Hislop) deserve credit for their management of the gas undertaking; but on that account there was the less need for Mr. Macfarlane speaking vaguely about it. If the looseness of the language were an inadvertence, that still does not remove the fact that it was balderdash. A further statement which Mr. Macfarlane made was that their surplus last year was £4487; and if they had not reduced the price of gas and had to pay £1000 for the completion of the railway siding and coal-stores, and £500 additional to the sinking fund, it would have been £7987. Was ever such nonsense heard? He might as well have added that, if they had not required to pay £21,522 for coal, &c., last year, the balance would have been £29,509. The items he mentioned were as much charges on the undertaking as were the coal and other commodities used. Last July, the Town Council appropriated from the gas surplus (accumulated) as much as £7875 for town improvements. Mr. Macfarlane had nothing to say about that; and yet it would have been a more solid subject to have talked to the electors about than the ones he chose.

Very different in character was the statement which Bailie MacKellar laid before the electors of the Fifth Ward in Glasgow on Monday night. This, which was simply a narration of figures, without comment, was to the effect that there were now 162,074 meters and 10,999 gas-stoves in use in the city; that last year 463,887 tons of coal were carbonized, the yield from which was 4,273,474,700 cubic feet of gas; that the greatest quantity of gas made in one day was 21,983,000 cubic feet; and that the largest amount sent out in one day was 22,835,700 cubic feet.

Mr. Ure, the Convener of the Gas Committee of the Glasgow Corporation, very judiciously did what he could, in addressing the electors of the Second Ward this week, to put right the public mind upon the old notion that reductions in the price of gas do not lead to consumers' bills being less. He found, he said, from investigation, that during the past year (when there was a reduction of 3d. per 1000 cubic feet in the price of gas), the citizens of Glasgow paid £45,000 less for gas than they did the year before. That disposes of the subject.

The Renfrew Corporation gas undertaking are getting better results since their new Manager has been at work. During September, the output of gas was 815,800 cubic feet of gas from 87 tons 17 cwt. of coal; whereas in September of last year, the output was 805,100 cubic feet of gas from 94 tons 11 cwt. of coal. There is still room for improvement, as the yield is only about 9200 cubic feet per ton. I expect, however, the quantity will still rise.

The strike of Scotch miners is practically over. Nearly all the men in the West of Scotland are at work; and only in Fifeshire and the Lothians is there any show of resistance. The collapse of the strike is due to the failure of the English members of the Federation to furnish levies sufficiently large to keep the Scotchmen idle. Though at the conference in Edinburgh a fortnight ago it was resolved to increase the levies, that appears to have been found to be impossible; and the consequence is that the men, deserted by their federated brethren, have gone back disheartened to work. The strike began sixteen weeks ago. It arose in this way: Last year, during the strike in England, the Scotch coalmasters got high prices for their coal; and the miners, on their own request, had their wages advanced 2s. per day. On the termination of the English strike, with the consequent drop in prices, the Scotch coalmasters took off half the advance, leaving the miners 1s. a day better than they were at the beginning of last year. It was against this that the strike was organized; and during all these weeks the impassioned cry of the agitator for a "living wage" has been founded, not on a depreciation, but an improvement in the position of the miner. Now that it is over, and the men have gained nothing, but lost a great deal in wages, it is seen that the whole proceedings were both foolishly conceived and stupidly worked. There is one comfort in connection with it, and that is that it will be a good few years before any agitator will be able to get the men to face a strike again; and so there is a prospect of peace in the coal trade, and low prices.

Sulphate of ammonia has been, of late, realizing £13 10s. per ton, which was less than prevailed before the coal strike. Now that the strike is virtually over, the price has this week receded to from £12 5s. to £12 7s. 6d. per ton, with a prospect of the market becoming weaker. The decline is attributed to the expected re-starting of iron-works; and the only hopeful feature is connected with that also—viz., the revival of the shipping trade.

The Edinburgh and District Water Trust on Thursday adopted, by 16 votes to 4, the Talla scheme for the augmentation of the water supply. The four who voted against the scheme advocated delay; but their object was really that they might have the opportunity of agitating in favour of the St. Mary's Loch scheme. I fear that St. Mary's Loch, which was such a hot favourite with many persons twenty years ago, and which many still would like to see adopted, must now be given up. Under the direction of Lord Provost Russell, the Talla Valley has been thoroughly prospected as to the quality and quantity of water, and as to the nature of the foundations for embankments; and when the Trust apply their minds to the subject, they proceed upon accurately ascertained data, and not upon conjecture. St. Mary's Loch has also been gauged; and it is found to be not so inexhaustible a source of supply as was thought. One great disadvantage there would be in the St. Mary's Loch scheme lies in the fact that in summer time the loch would be so reduced that about 200 acres of its bed would be exposed. That would be next to intolerable in a natural loch; and therefore everything points to another source of supply. The only other source which is available would seem to be the Talla, which has been adopted. The Trust are to prepare for the promotion of a Bill in next session of Parliament, authorizing the scheme. The estimated cost is £631,000 for a first instalment of 10 million gallons per day; and it is anticipated that it will take till about 1901 to complete the necessary works.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 13.

Sulphate of Ammonia.—There is nothing to be added to last week's report. There is no pressure to sell; but a certain clique of dealers have taken it upon themselves to fix the values—not a difficult matter while the present state of things (*i.e.*, the paucity of demand) exists. The object of the operators may be a twofold one—viz., to cover sales made at the higher prices, and to induce producers to accept low prices for future delivery. It would be a pity if makers took alarm, and disposed of their coming production to meet the aims of the speculators. The position is almost certain to right itself before the end of the year. This must at least be assumed, seeing that requirements for the coming season are almost entirely unprovided for. Meanwhile, the London quotations have completely disorganized the country; and their influence upon the Scotch markets has been most startling. Sales were reported at Leith at £12 2s. 6d.; while Hull and Liverpool were still quoted at £12 7s. 6d. to £12 10s. The latter market, however, is giving way also; local sellers being helpless in the present state of things.

LONDON, *Oct.* 13.

Tar Products.—After displaying considerable life, benzols have relapsed; and for the present they look like again falling in value—indeed, the price is already at least a halfpenny lower. More business is being done in naphthalene. But the price is just about fuel value; and the same may be said of creosote. Heavy tar oils are selling a little better—a good quantity being exported for special purposes. Carbolic acid continues fairly well inquired for; but the price is easier. Pitch looks as if it had touched top prices, although the advent of a foreign syndicate may have the effect of bolstering it up for some time. Unfortunately, few, if any, distillers are getting the advantage of the present high prices of pitch, as it is the custom of the trade to sell well ahead, and most of them will be contracted at a much less price. Business has been done during the week at the following rates: Tar, 16s. to 19s. 6d. Pitch, 36s. to 39s., according to position. Benzols, 90's and 50's, 1s. 2d. Solvent naphtha, 1s. 3d. Toluol, 1s. 4d. Crude naphtha, from 5d. to 6d. Creosote, liquid, 2¼d.; ordinary, 1¼d.; salts, 17s. Carbolic acid, 1s. 6d. Cresylic acid, refined, 1s.; brown, 9½d. Anthracene, nominal, "A," 1s. 2d.; "B," 11d.

Sulphate of Ammonia is much weaker, thanks to the operation of middlemen, who undoubtedly have large orders "up their sleeves." Business during the week has been done at prices ranging from £12 2s. 6d. to £12 10s., less 3½ per cent.; while gas liquor is offered at 9s. to 10s. 6d.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The position in the coal trade remains practically unchanged; and except that rather more buying is going on in house-fire qualities, the demand all through continues extremely slow, with pits only in exceptional cases working more than four days per week. There is perhaps rather a steadier tone as regards the better qualities of round coal. It is, however, still exceptional where more than 11s. is obtained for best Wigan Arley; 10s. for Pemberton four-feet and seconds Arley; with commoner descriptions of round coal ranging from 7s. for steam and forge coal, up to 8s. for house-fire qualities at the pit mouth. Engine classes of fuel continue more or less of a drug; and surplus supplies are pushed on the market at excessively low figures. Common slack can be readily bought at 3s. 6d. to 4s.; medium sorts, 4s. 6d. to 5s.; with the best qualities fetching about 5s. 6d. per ton, at the pit mouth. For shipment, there is only a moderate business doing, with, of course, a cessation of inquiries from Scotland; and prices are easier if anything—8s. 6d. to 8s. 9d. representing about the average figures for ordinary qualities of common round coal delivered at the ports on the Mersey.

Northern Coal Trade.—There is this week a further falling off in the demand for coal for Scotland, owing to the collapse of the strike there; and thus there is rather more coal thrown on this market, especially manufacturing fuel. The effect has been to weaken prices to some extent. Best Northumbrian steam coal is still steady, with a fair demand up to the end of the Baltic shipping season, though for later delivery lower rates are now being quoted. The price for immediate delivery may be put as from 10s. 6d. to 10s. 9d. per ton f.o.b., whilst for second-class steam coals the rate is 1s. per ton less. Small steams are now more plentiful; and from 4s. 6d. to 5s. per ton may be looked on as the current quotation. The consumption of gas

coals is now steadily enlarging; and the deliveries are rising in quantity. The price varies, for odd cargoes, from 7s. 3d. to 7s. 9d. per ton f.o.b., according to quality and the position of the pit; whilst the contracts that are now running are generally about the same rate. Manufacturing coals are dull, and the prices quieter. Coke is still well sold for the local blast furnaces, though shipments are small, and the north-west is also limiting its purchases. Best Durham coke commands 13s. 6d. to 14s. 6d. per ton f.o.b., though there are sales outside these prices. Gas coke is unaltered this week in price; but some large contracts are now in course of treaty.

Scotch Coal Trade.—The coal trade in Scotland once more exists in a form in which it can be dealt with. Last week so many miners had returned to work that some coal masters were able to send out circulars intimating that they would supply coal at prices from 6d. to 1s. higher than were being received in June last. Third-class cannel has been raised 2s. per ton on the price last June; and there is a great demand for it. House coal can be had at from 8s. to 18s. per ton, delivered; splint, at the pit mouth, is selling for 7s. 6d.; ell, at from 8s. to 9s.; and dross, at 5s. per ton. These prices are, however, not by any means general; and in many instances much higher sums are being paid. Shipments during the week rose to 24,826 tons—an increase upon the preceding week of 11,603 tons, but a decrease as compared with the corresponding week of last year of 216,800 tons. For the year to date, the total shipments have been 3,819,057 tons—a decrease compared with the corresponding period of last year of 2,022,893 tons. The total decrease during the strike amounted to 2,065,158 tons.

Alderman Lennard and Gas-Meter Rents at Leicester.—Speaking at a public meeting of burgesses in the Castle Ward of Leicester last Thursday, Alderman Lennard, the Chairman of the Corporation Gas Committee, stated that he was not opposed to the abolishing of meter-rents, if the town were prepared to forego the £4000 of the profits which went towards the rates; and as soon as they could do without depending upon these profits, he was in favour of giving them to the working men, for they had the first claim upon any benefits the Committee could apply. He also mentioned that he had proposed things which had raised the wages paid to workmen in the Gas Department by £5000 per annum.

Electric Lighting at Halifax.—In about six weeks' time, the Engineer of the Halifax electricity works (Mr. Wilmshurst) hopes to be able to supply current over an area in which 20 miles of cables have been laid. With the view of extending the plant as cheaply as possible when the demand requires it, the station has been constructed on an extensive scale. The boiler-house is large enough to hold nine boilers of 300-horse power. Three of these are in position; and a fourth will be delivered shortly. The house has a steel roof, level with the adjacent railway. This has been so constructed to admit of a small siding being made, whereby trucks of coal can run direct on to the roof, which will be utilized as a coal-store. The engine and dynamo room is 110 feet long and 55 feet wide. It is proposed to erect here five engines, two of 200-horse power each, one of 100-horse power, and two small ones of 25-horse power; but the house is capable of accommodating twice this number. The dynamos stand several feet apart from the engines; and the three already laid down will supply current for 4500 16-candle power lamps.

The East London Water Company Summoned.—Last Wednesday, at the Thames Police Court, before Mr. Mead, the East London Water Company were summoned for neglecting to supply water to William Taylor, the occupier of No. 36, Turner's Road, Burdett Road. It appeared that the landlord of the premises had contracted to pay the water-rate, though the house was rated at more than £20 a year; and the supply was cut off on account of a leaky tap. Mr. Kebbell, on behalf of the Company, stated that a notice calling the attention of the owner or occupier to the escape of water had been sent prior to Sept. 26. The waste was 30 gallons an hour—sufficient to supply 72 persons with water. Altogether, in 24 hours, the waste amounted to 720 gallons. After the notice had been served, nothing was done. On the 2nd inst., a servant of the Company went to the house, and, finding the waste still going on, cut off the water. Mr. Mead said he always considered that total deprivation of water was to be deplored; and whenever this was done, the matter should be fully inquired into. In the present case, it was clear the Company had not exceeded their powers in any way; and the summons would be dismissed. He could not, however, allow the Company costs. They had vindicated their character; and this must be a source of great satisfaction. Mr. Kebbell pointed out that such cases entailed considerable expense.

The Management of the Halifax Corporation Gas-Works.—In the JOURNAL last week (p. 706), we gave, from particulars contained in one of the Halifax papers, an abstract of a report prepared by Mr. T. Holgate, the Gas Engineer to the Halifax Corporation, in answer to certain disparaging statements made as to the management of the works. It may be remembered that Mr. Holgate, in comparing the present with the past condition of his works, distinctly stated that he "cast no imputation upon his predecessor or others." But it was only natural that the "predecessor" in question (Mr. W. Carr) should have something to say on the matters dealt with. A copy of Mr. Holgate's report having been forwarded to him, he "looked it over," and conquering his first promptings to take no notice of it, he boldly attacked it; and his comments thereon were set forth in a letter to the gentleman who forwarded the report, and who subsequently sent Mr. Carr's reply to the Halifax papers. In that reply the writer not only vigorously defends himself, but attacks his successor's system of management. We could only give in our previous issue an outline of Mr. Holgate's report, and therefore must not follow Mr. Carr through his long series of charges. We can only say that he concludes his letter with the statement that "the Gas Committee have never paid their way during the last five years, much less made a profit; while in the course of this period they have borrowed and added to their capital account somewhere about £100,000." He then asks where this money has gone; following up the question by a series of others which certainly call for some authoritative reply.

The New Water-Works for Pemberton.—The Pemberton Local Board have lately completed some important extensions of their water-supply system. The present works were commenced eighteen years ago; and during that period eighteen different contracts had been entered into. The total cost of the works has been £101,600, made up as follows: Reservoirs, conduits, and distributing-mains, £68,200; cost of land, £23,400; Acts of Parliament and Provisional Orders, law costs, and Engineer's commission, £10,000. The daily consumption is about 220,000 gallons; and the storeage is equal to 70 millions.

The Failure of the Promoter of the British Water-Gas Company.—In the London Bankruptcy Court last Friday, before Mr. G. Wreford, the Senior Official Receiver, the first meeting was held of the creditors of Mr. J. C. Cottam, the promoter of the British Water-Gas Company, whose failure was mentioned in the JOURNAL for the 18th ult. (p. 571). The debtor had not filed the statutory accounts, but said he hoped shortly to do so. It was difficult for him to estimate the amount of his liabilities; but he thought his indebtedness might amount to about £150,000—his private liabilities being only £500. The heaviest loss he had incurred in the course of his career was £100,000 in connection with the British Water-Gas Company. No proposal was made on his behalf; and the usual resolution for bankruptcy was passed. Mr. Newstead was appointed Trustee of the estate, together with a Committee of Inspection.

Water Companies' Regulations.—At the meeting of the London County Council last Tuesday, the Public Health and Housing Committee reported that the London Water Companies had declined to carry out the most important of the alterations the Council requested them to make last February in the regulations drawn up under the Metropolis Water Act, 1871. The principal alteration would increase the capacity of flushing-cisterns from 2 to 3 gallons; and the Companies pointed out that it would cause an enormous addition to the consumption of water, and entail increased expense to the public in regard to the requirements of the future supply. The Committee recommended that a letter be addressed to the Local Government Board, communicating the purport of the correspondence that had taken place between the Council and the Companies, and asking the Department to appoint a competent person to report upon the subject. The recommendation was adopted.

Failures of the Electric Light at Woking.—The unreliability of the electric light has somewhat disturbed the minds of those tradesmen in the Woking Station district who have gone to the expense of having their premises wired and fitted for the light. On two or three occasions, there have been trifling interruptions in the supply of electricity; but a rather more serious difficulty occurred on a recent Thursday evening, when, for a considerable time, the light was not available, owing, it is believed, to a slight disarrangement of an engine at the works. The failure occurred soon after six o'clock; and it was quite half-past seven before the current was again at command. A number of the tradesmen have had a meeting on the subject; and gentle hints were thrown out that, unless the supply was more satisfactory, changes would have to be made in the mode of lighting. A representative of the Company was present, and promised on their behalf that there should be no cause of complaint in the future.

Interruption of the Electric Lighting in the City.—We learn from the *Electrical Review* for Friday last that inconvenience was caused in the City on the previous Tuesday afternoon, during a period of the foggy darkness, by a stoppage in the supply of the City of London Electrical Lighting Company. Fortunately, it was only of short duration, and was confined to the domestic lighting of a portion of the central district of the City. The official explanation of the occurrence is the failure of a "temporary machine" erected by the Company's Contractors to enable them to cope with the very heavy demand required by their customers pending the erection of further permanent plant. Our contemporary, while refraining from criticizing this unfortunate occurrence too closely, takes it as a confession of weakness that the sudden stoppage of the lighting should be due to the breaking down of a "temporary" machine. It considers that "the Company should by this time have got beyond temporary devices."

Disputed Meter Registration.—At the Westminster County Court on Monday last week, before Mr. Lumley-Smith, Q.C., the case of *The Gaslight and Coke Company v. Barker* was heard. It was a claim by the Company for £10 14s. 4d. for gas supplied; the defendant making a counterclaim for £15 8s. 4d., which he alleged had been overpaid. Mr. Barker occupied a "flat" at 1, Cheyne Walk, Chelsea; and he had on hire several gas-stoves furnished by the Company. In the quarter ending December, 1893, the meter registered a consumption of 88,000 cubic feet of gas, which included five days when all the stoves were in use to dry the walls. For this the landlord agreed to allow the defendant 20,000 cubic feet; leaving 68,000 feet as the quarter's ordinary consumption. Defendant went to America, and left the rooms in charge of his son, with injunctions to be sparing in the use of gas. When the account for the March quarter came in, it was found to be for £16 4s. 2d., for 108,400 cubic feet. A cheque was sent for the amount; but objection being subsequently raised to the quantity, and inquiry being made, it was ascertained that the meter had really registered only 8400 feet. Defendant's son had expressed surprise at this small consumption; and then the meter inspector, assuming that the index had completed one revolution, put down "10" before the figures on the card, making them into 108,400. The meter was changed; and in the next quarter only £10 worth of gas was consumed, though an additional stove had been put in which was kept burning all day. It was stated that the gas had been very economically used in Mr. Barker's absence. Mr. Millward, one of the Company's inspectors, said he estimated from one night's consumption that about 72,000 feet would be burnt in the quarter; and Mr. Marsh, who had tested the meter, thought between 70,000 and 80,000 cubic feet would be a reasonable quantity, considering the number of stoves and lights. It was contended, for the defendant, that the Company could only charge for the gas actually registered by meter. His Honour, however, held that they were justified in their demand; and he gave judgment for them, with costs, on both the claim and counterclaim.

Reductions in Price.—On the recommendation of the Gas and Electricity Committee, the Southport Town Council have agreed to reduce the price of gas used for all purposes other than lighting by 6d. per 1000 cubic feet, provided it is supplied through a separate meter. The Directors of the Wandsworth and Putney Gas Company announce their intention of reducing the price of gas from 2s. 8d. to 2s. 6d. per 1000 cubic feet after the taking of the meter indices at the Christmas quarter. At Portobello, the Directors of the Gas Company have resolved to reduce the price from 4s. 6d. to 4s. per 1000 cubic feet after the November survey. The Gas Committee of the Newry Town Commissioners reported, at their meeting on Monday last week, that they had resolved to reduce the price of gas by 5d. per 1000 cubic feet from the 1st inst., and also to take off the meter-rent. This will be a concession of about £800 per annum to the consumers, who are highly pleased with the proposal.

The Water Supply of Downpatrick.—The Town Commissioners and inhabitants of Downpatrick (Ireland) are greatly troubled on account of their new water supply. Already about £12,000 has been spent on the works, which, it is stated, were undertaken on the faith of a report prepared by Mr. Macassey, in which he averred that the gathering-ground was a "most satisfactory" one, and would yield "pure and soft water." It is now alleged that the water is wholly unfit for drinking and domestic purposes; and at a public meeting of ratepayers a few days since, it was decided to present a memorial to the Local Government Board, praying them to at once send an engineer to inspect the works, and to hold an inquiry into the causes of the defects complained of, the manner in which the works have been executed, and the necessary remedies. A further resolution was passed to the effect that no compromise between the Sanitary Authority and the contractor or engineer would be satisfactory to the ratepayers until the reservoir has been thoroughly inspected by a competent and impartial engineer; and the feasibility, or otherwise, of removing the boggy matter, in accordance with the specification, has been definitely ascertained.

Fatal Accident at the Bankside Electric Light Station.—We take the following particulars from the *Electrical Review* for the 5th inst.: "Last Sunday afternoon, two employees of the Brush Company were repairing one of the switch pillars, which stand about 20 feet apart, along the switch gallery of the station at Bankside. One of the men—a fitter—was at work behind the pillar, about 5 feet from the gallery floor, having used a ladder for getting up. His labourer, a man named Hearne, took the ladder away unnoticed, placed it against an adjacent pillar which was 'alive' at the time, and went up to the top, where the only exposed contacts are. The first intimation that anything was wrong was conveyed by a scream from the injured man; and on the fitter coming round to the front, he saw his mate lying on the gallery. He jumped down, and with the assistance of the station hands, who were soon on the spot, tried to resuscitate the man; but their efforts were unavailing. A doctor arrived shortly after the accident; but he immediately pronounced life extinct. The deceased had been employed on work of the same kind for about two months, and knew thoroughly the danger of touching anything. Only 15 feet from where the accident occurred, a notice was displayed absolutely forbidding anyone to do the very thing which led to the man's death. The pressure was 2000 volts alternating. No burns or discolorations were noticed either on the skin or clothing of the man; but there was an ugly wound on the back of his head, caused by the fall against the gallery railing." An inquest was held on the 5th inst., and the jury returned a verdict to the effect that death was caused by stoppage of the heart's action, consequent upon electric shock.

Lamplighters' Work and Wages in Liverpool.—The Lamplighters' Friendly Association of Liverpool have a grievance against the Corporation; and with the view of having their case laid before the public, they have addressed a letter to the United Trades and Labour Council. They say that the Corporation have undertaken to light a portion of the city lamps, employing their own men at a weekly wage; and if they take over the whole of the lamps, several men will be thrown out of employment, some of whom have been in the service of the Gas Company from 5 to 25 years. Moreover, they greatly complain of the amount of work the Corporation give their men for a weekly wage, seeing that the week consists of seven days and nights. Comparing the work in the area now lighted by the Corporation and the wages paid by them with the work and wages in the same area under the Company, they state that the district is divided into five portions. The first contains special Bray lamps; and the Corporation man has to light, reduce at 11 p.m., and put out in the morning 124 of these, covering a distance of about three miles each turn. He has also to turn out and clean the lamps during the day, for all of which he receives the sum of £1 6s. as wages. In No. 2 district of 97 special Bray lamps, the Corporation man lights, reduces at 11 p.m., puts out in the morning, and cleans during the day, receiving £1 6s. In No. 3 district, comprising 138 small lamps, the Corporation man has to light, and put out, also to keep clean, for £1 6s. In No. 4 district, with 109 small lamps, the Corporation man has to light, reduce at 11 p.m., put out, and clean during the day, for £1 6s. No. 5 district comprises 101 small and two large Bray lamps; and one man has to light, reduce, and put out, as well as clean, for £1 6s. Under the Gas Company, No. 1 district was distributed among several men; but at the rate they were paid, if one had to light the whole 124, he would have received about £3 10s., and that only for lighting and putting out, as an extra man would be employed for reducing at 11 p.m. In No. 2 district, the men received 1s. per week for large and 6d. for the smaller lamps; and if one man had to light the 97 lamps, he would have received £1 6s. for two turns only. In No. 3 district, the Company's men were paid 3½d. per lamp per week. If one man had to light this number, he would have obtained £2 0s. 4d. In No. 4 district, the Company's men would receive £1 11s. 9d. for lighting and putting out only, as an extra man would do the reducing at 11 p.m.; and in No. 5 district, the Company's man would receive £1 11s. 5d.; an extra man doing the reducing at 11 p.m. The Secretary of the Trades and Labour Council invites the Lighting Committee of the Corporation to make an explanation on the subject; and he asks whether the statement affects the much-talked-of saving of £7000 in the public lighting.

Collapse of a Scarborough Reservoir.—The concrete bottom of the reservoir at Osgodby, which supplies Scarborough with water, subsided during Sunday night of last week; wasting about 4 million gallons of water. The water supply of the town will not be affected, as there is a large reserve at Irton. It is impossible to say exactly what damage has been done; but it is considered that £500 will probably cover the cost of repairs. The reservoir is a very old one, and was rebuilt in 1857.

Fatal Gas Explosion at Liverpool.—A disastrous explosion of gas occurred in the house of Mr. F. Rose, dental surgeon, at Mount Pleasant, Liverpool, last Thursday morning. The cause of the explosion is as yet a mystery; but it is surmised that William Muir, the butler, went into the waiting-room with a naked light to search for an escape of gas. Muir was terribly injured about the body and head, and when discovered was a mass of flames. He was conveyed to the Southern Hospital, where he died in the afternoon. Happily all the other inmates escaped injury; but a considerable amount of damage was done to the house and furniture.

The Revenue of the Liverpool Corporation Water Department.—At the meeting of the Liverpool Corporation Water Committee last Tuesday, the Engineer reported that the 9-inch main to supply the Leigh and Hindley districts had been thoroughly overhauled; and those localities could now be supplied with water ample for their requirements. The Chairman (Alderman T. Hughes) said he should like to point out in reference to this matter that, since the water had been taken by these districts from the beginning of the present month, the consumption had been 490,000 gallons per day, which would mean to the Corporation an increased revenue of £4400 a year. This, he thought, was a highly satisfactory arrangement. The Treasurer announced that up to the present he had received £192,821 for water, compared with £183,167 for last year; being an increase of £9654.

A Sequel to the Lambeth "Bath-Tax" Agitation.—At the South-Western Police Court on Wednesday last, before Mr. Denman, Mr. W. H. Edmonds, of No. 19, Kingswood Road, Brixton Hill, appeared to answer a summons, at the instance of the Wandsworth District Board of Works, for permitting his house to be occupied without first obtaining a sufficient water supply. The proceedings were the outcome of a dispute which the defendant had had with the Lambeth Water Company concerning the "bath-tax." The defendant, it may be remembered, refused to pay the rate demanded, and consequently the Company caused the supply of water to be cut off from the whole house. The defendant proceeded against the Company; but Mr. Denman, who heard the case, decided in favour of the latter—holding that they were justified in their action owing to the non-payment of the rate (see *ante*, p. 478). Mr. W. W. Young supported the summons, and called Mr. Fairchild, the Sanitary Inspector, to prove that there was no water supply. The defendant said the proceedings were taken on his own initiative, as he knew the house was in an insanitary condition. After the Magistrate had decided against him, he called at the Company's office, and asked to see the Secretary. This request was refused. He asked the clerk: "What are your terms now I am defeated?" The clerk replied: "We shall not lay on the water until you pay the arrears—£1 7s. 2d.—together with 5s., the cost of laying on." He left the office to consider the matter, as he was determined not to be cheated by the Company. He had been served with a notice that his furniture would be seized for the recovery of costs; and an application had now been made to remove him from a house which had been bought and paid for. He appealed to the Magistrate's sense of justice. Mr. Denman said it was clear the house was without a proper water supply. The defendant chose to have a quarrel with the Water Company, and, without seeking a remedy, "knocked his head against a stone wall." If he was not satisfied with the "tax," he could dispense with a fixed bath, and have the water supplied to the house. By refusing to pay the rate or remove the bath, he rendered himself liable to these proceedings. His Worship made an order for the closing of the premises, with 3s. costs.

A Dispute over Defective Gas-Meters at Birmingham.—At the Birmingham Police Court last Thursday, Messrs. Barker Brothers, electro-platers, &c., were summoned at the instance of the Corporation Gas Department for payment of £28 5s. 10d., alleged to be due for gas consumed and not registered, through the defective state of the meters. The defendants, on the other hand, contended that they had overpaid the department for 40,000 cubic feet of gas. Mr. M'Cardie, who appeared for the Corporation, stated that at Messrs. Barker's there were three meters—No. 1 for 200 lights, and Nos. 2 and 3 for 100 lights each. The state of the meters was taken on Dec. 23, 1893; and in February last there was evidence that meters Nos. 2 and 3 became defective. On Feb. 15 No. 2 was cut off; and the fittings usually supplied from that meter were connected with No. 3. Subsequent readings of No. 3 did not show the increase of consumption expected; and it was thought that gas must have passed through No. 2, which was not accounted for. In consequence, estimates were made based on comparisons of consumption for corresponding quarters upon the hours worked at Messrs. Barker's and upon the wages paid by the firm; and it was calculated that the consumption in addition to that registered amounted to 223,500 cubic feet. It was stated in evidence that certain reductions had been made which brought the deficiency down to 160,000 feet, and that, when No. 2 meter was renewed, it was found that the spindle was broken, which was the cause of the gas passing without being registered. Mr. Carslake, for the defence, contended that the estimate was altogether excessive. Mr. Herbert Barker, one of the partners, said that he supervised the gas consumption at the works. They were surprised at the amount of the gas account for the March quarter of 1893; and, in consequence, they took weekly readings. In September, 1893, the firm consulted with their manager how they could economize in the gas consumption; and it was decided that the men should cease work at dusk in the March quarter of this year. From Christmas, 1893, to March, 1894, they were slack at the works; and during that time the men left work according to the daylight. It was not correct to base the estimate on prior years, because the conditions were not the same. The Bench, taking into account the calculations, were of opinion that the defendants should pay on an additional 144,000 cubic feet; but no order was made as to costs.

Redruth Water-Works Extensions.—Seventeen tenders were received for the construction of the works required for the improvement of the water supply of Redruth. These were opened at a meeting of the Local Board yesterday week; and that of Mr. Delbridge, of Camborne, to do the work for £7320, was accepted. The Board propose to borrow £9000 from the Public Works Loan Commissioners.

New Joint-Stock Companies.—The Llanberis Water and Gas Company, Limited, has been formed with a capital of £5000, in £1 shares, to establish and carry on works for the supply of gas, water, electricity, &c., in the parish of Llanberis, Carnarvonshire. The Harefield Grove and Springwell Water Company, Limited, has been started with a capital of £50,000, in £10 shares, to carry into effect an agreement, made between G. Webster and F. Larpent, to construct water-works and supply water to certain places in Hertfordshire, Berkshire, and elsewhere.

Electric Lighting for Cheltenham.—The construction of the Cheltenham Corporation electric lighting station has been commenced. The site is at the ash-destructor, which (says a local reporter) "will supply heat equivalent to between 60 and 100 horse power, which can be converted into electric current without cost to the ratepayers." The high-pressure alternating system has been adopted; and the charge is to be 6d. per Board of Trade unit, with rebates to large consumers. At first the supply will be practically confined to the High Street and Promenade—the principal streets of the town—and private consumers only will be served; the question of street lighting remaining to be considered.

The Swansea Water-Works Arbitration.—A meeting of the Water and Sewers Committee of the Swansea Corporation was held last Tuesday, to consider a proposal for the settlement of the claim brought by Messrs. Baldry and Yerburg, the contractors for the Upper Lliw reservoir, for the sum of £67,000 extras. The question has for thirteen days been the subject of arbitration proceedings before Mr. Bucknill, Q.C., M.P.; and the offer of the claimants was to settle for £10,500, each side to pay their own costs and half each of the arbitration and shorthand writers' charges. The Committee decided to accept the offer. The following are the full terms of the settlement: "The Corporation to pay the contractors the admitted extras and retentions, which have been agreed to at £8447 3s. 7d., and the further sum of £10,500. The plaintiffs to take out of Court the £125 4s. 5d. still in Court. Each party to pay their own costs, notwithstanding any order to the contrary, including half the Arbitrator's fee, the shorthand notes, printing, and the expense of room. If any difference arises in carrying out these terms, the same to be referred to Mr. Hudson and Mr. Graham, and, if they differ, to the Arbitrator.

The Financial Results of the Whitehaven Electric Lighting Installation.—The Chairman of the Trustees of the Town and Harbour of Whitehaven (Mr. J. G. Dees) communicated to his colleagues at their last meeting the following figures showing the financial position of their electric-lighting venture. He said that the present capital expenditure was £12,760; and the liabilities incurred were £2734. Taking the capital at £15,500, the annual instalment rate was £1085. The estimated working expenses of the station were £930; and the total annual expenditure, £2015. The receipts from the harbour for lighting were £220; and for private lighting, based upon the actual supply at present, the receipts equalled £1028—making a total income from the harbour and private lighting of £1248. If they had obtained £910 for lighting the town (which it would have cost for gas), there would be a profit of £143 per annum. It was now proposed to provide two more dynamos. This had become an absolute necessity; and the provision of these would cost £1479, and would raise the capital to £17,500. Taking credit for the output of only one more dynamo, and leaving the other dynamo for emergencies, this would give receipts amounting to £1444, or a profit—charging public lighting as before—of £232 per annum.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 732.)

Issue.	Share	When ex-Dividend.	Dividend for Half-year ending Dec.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	11 Oct.	10½	Alliance & Dublin 10 p. c.	10	18½–19¼	..	5 7 8
100,000	10	,,	7⅞	Do. 7 p.c	10	12⅝–13⅜	..	5 11 1
300,000	100	2 July	5	Australian (Sydney) 5 % Deb.	100	105–107	..	4 13 4
100,000	20	14 June	8	Bahia, Limited	20	11–13	..	12 6 2
200,000	5	11 May	6½	Bombay, Limited	5	6½–6⅝	..	4 16 5
40,000	5	,,	6½	Do. New	4	4¼–4½	–¼	5 9 5
380,000	Stck.	15 Aug.	11½	Brentford Consolidated	100	222–227	..	5 1 4
180,000	,,	,,	8½	Do. New	100	175–180	+1	4 14 5
220,000	Stck.	28 Sept.	11	Brighton & Hove Original	100	208–213	+1	5 3 3
888,500	Stck.	30 Aug.	5	Bristol	100	114–117	..	4 5 6
320,000	20	28 Sept.	11½	British	20	48–49	..	4 11 5
50,000	10	30 Aug.	11½	Bromley, Ordinary 10 p. c.	10	21½–22½	..	5 2 2
51,510	10	,,	8½	Do. 7 p. c.	10	16½–17½	..	4 17 2
328,750	10	28 June	2	Buenos Ayres (New) Limited	10	7–8	..	2 10 0
200,000	100	2 July	6	Do. 6 p. c. Deb.	100	101–104	..	5 15 5
150,000	20	12 July	8	Cagliari, Limited	20	25¼–26⅜	..	6 0 8
550,000	Stck.	11 Oct.	13	Commercial, Old Stock	100	265–270[x]	+1⅜	4 16 4
165,000	,,	,,	10	Do. New do.	100	195–202[x]	..	5 0 0
160,762	,,	14 June	4½	Do. 4½ p c. Deb. do.	100	132–137	..	3 5 8
800,000	Stck.	14 June	13	Continental Union Limited	100	240–245	..	5 6 1
200,000	,,	,,	10	Do. 7 p. c. Pref	100	210–215	..	4 13 0
535,000	Stck.	30 Aug.	5	Crystal Palace Ord. 5 p.c. Stk	100	108–113	+1	4 8 6
486,090	10	27 July	11	European, Limited	10	22½–23⅜	..	4 13 7
354,060	10	,,	11	Do. Partly paid	7½	16–17	..	4 17 1
5,646,590	Stck.	15 Aug.	12	Gaslight & Coke, A, Ordinary	100	248–252	+1½	4 15 3
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100–104	..	3 16 11
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	277–282	..	3 10 10
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130–135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	200–205	..	3 13 2
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	180–185	..	3 15 8
4 63,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	272–277	..	3 12 3
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	165–170	..	3 10 7
1,061,150	,,	14 June	4	Do. 4 p. c. Deb. Stk.	100	127–130	..	3 1 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	132–137	..	3 5 8
908,000	,,	,,	6	Do. 6 p. c. do	100	177–182	..	3 6 0
3,800,000	Stck.	11 May	12	Imperial Continental	100	228–233	+1	5 3 0
75,000	5	14 June	6	Malta & Mediterranean, Ltd.	5	5–5⅛	..	5 9 1
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	109–111	..	4 10 1
541,920	20	14 June	5	Monte Video, Limited	20	15–16	..	6 5 0
150,000	5	30 May	8	Oriental, Limited	5	7–7⅛	..	5 6 8
60,000	5	13 Sept.	7	Ottoman, Limited	5	4–4⅛	..	7 15 6
166,870	10	31 Jan.	2	Pará Limited	10	1¾–2⅛	..	8 17 9
				People's Gas of Chicago—				
480,000	100	2 May		1st Mtg. Bds.	100	104–108	..	5 11 1
500,000	100	1 June	6	and Do.	100	98–103	..	5 16 6
150,000	10	11 Oct.	6	San Paulo, Limited	10	9–9⅛[x]	..	6 6 4
500,000	Stck.	30 Aug.	15½	South Metropolitan, A Stock	100	330–335	+2	4 12 6
1,350,000	,,	,,	12	Do. B do.	100	277–282	..	4 5 1
260,000	,,	,,	13	Do. C do.	100	287–292	..	4 9 0
750,000	,,	12 July	5	Do. 5 p. c. Deb. Stk.	100	156–161	..	3 2 2
60,000	Stck.	30 Aug.	11½	Tottenham & Edm'nton, "A"	100	215–220	..	5 4 7
				WATER COMPANIES.				
746,011	Stck.	28 June	10	Chelsea, Ordinary	100	285–290	..	3 9 0
1,719,514	Stck.	11 Oct.	8	East London, Ordinary	100	230–235[x]	+2	3 8 1
634,740	,,	28 June	4½	Do. 4½ p. c. Deb. Stk.	100	147–152	..	2 19 2
700,000	50	14 June	8½	Grand Junction	50	120–124	..	3 8 7
708,000	Stck.	15 Aug.	12	Kent	100	302–307	..	3 18 2
1,043,800	100	28 June	9½	Lambeth, 10 p. c. max.	100	265–270	..	3 10 4
406,200	100	,,	7½	Do. 7½ p. c. max.	100	208–211	..	3 11 1
330,000	Stck.	28 Sept.	4	Do. 4 p. c. Deb. Stk.	100	132–135	..	2 19 3
500,000	100	15 Aug.	12½	New River, New Shares	100	382–387	..	3 2 8
1,000,000	Stck.	27 July	4	Do. 4 p. c. Deb. Stk	100	134–137	..	2 18 4
902,300	Stck.	14 June	6	S'thwk & V'xhall, 10 p. c. max.	100	168–173	..	3 9 4
126,500	100	,,	6	Do. D 7½ p. c. do.	100	150–155	..	3 17 5
1,155,066	Stck.	14 June	10	West Middlesex	100	273–278	..	3 12 0

[x] Ex div.

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PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

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HYDRAULIC AND GAS ENGINEERS,

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Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM, PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

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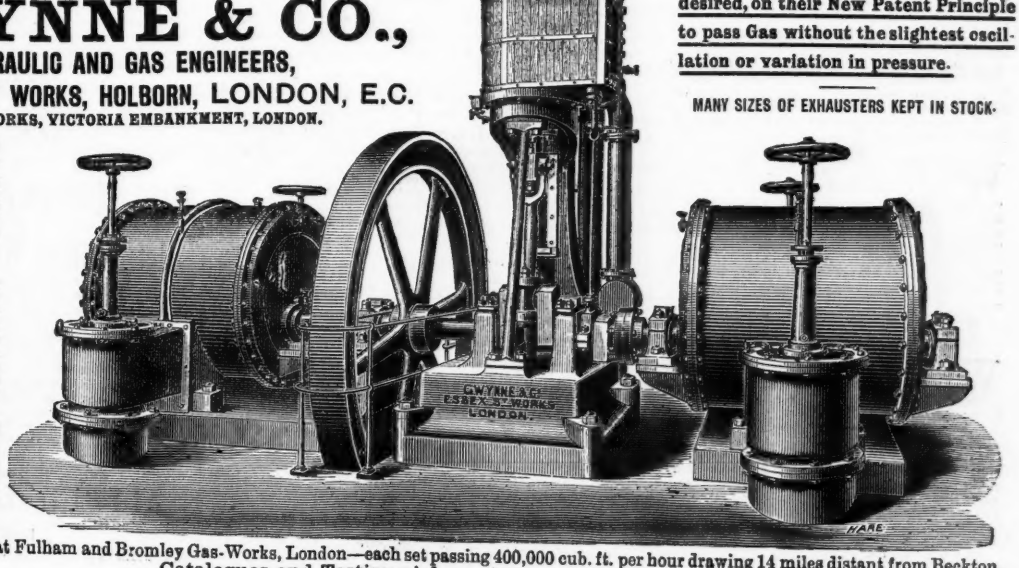

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JOHN WM. O'NEILL, Managing Director.

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ANDREW STEPHENSON, Agent. All communications *re* OXIDE to be addressed to PALMERSTON BUILDINGS, E.C.

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BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR Wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

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BROTHERTON & CO.
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REDHILL GAS-WORKS ASSESSMENT APPEAL.

THE Report of the proceedings at the hearing of the APPEAL of the REDHILL GAS COMPANY against the RATING OF THEIR PROPERTY in Reigate and Nutfield which was published in the JOURNAL has been reprinted (by desire) in Pamphlet form; and copies can be obtained, on application to the PUBLISHER, *price 4d. each.*

NOTICE OF ACCIDENTS ACT, 1894.

A CARD suitable for Exhibiting in Gas- Works, directing Officers and Workmen to REPORT to the Manager or Deputy-Manager all ACCIDENTS witnessed by them, together with the Clause of the Act specifying the notice required to be sent to the Board of Trade, has been prepared in compliance with a suggestion; and copies can be obtained, on application to the PUBLISHER of the JOURNAL, *price 4d. each, or 2s. 6d. per dozen, post free.*

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WALTER THOMASON and SONS. Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
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GAS-FITTER (age 24) seeks Situation. Four years with large Gas Company. Good reference.
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WANTED, a Working Manager for a small Gas-Works situated in the Midland Counties, making from 10 to 12 million cubic feet per annum. House, Fuel, and Gas provided. The person appointed would be required to commence duties about the end of November next.
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WANTED, immediately, a competent WATER INSPECTOR, &c, accustomed to Inside and Outside Work, Waste-Water Meter System, Indexing, Main and Service Laying, Plumbing, &c. Applicants to state their experience in each of the above branches. Wages 30s. per week.
Applications, by letter, in Candidates' own handwriting, stating ages (30 to 40), previous employment, and accompanied by not more than three recent testimonials, to be sent to the undersigned, on or before the 20th inst.
T. N. RITSON,
Engineer and Manager.
Gas-Works, Kendal,
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*** See Advertisement p. III., centre of JOURNAL.
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PREPARED from pure Iron
Two or three times as rich as Bog Ore.
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SULPHATE OF AMMONIA.

THE Directors of the above Company are prepared to receive TENDERS for about 25 tons of SULPHATE OF AMMONIA for delivery between Oct. 29 and Nov. 6 next.
For Samples and Conditions of Sale and Delivery, apply to the Manager of the Company, Mr. H. H. Jones.
Tenders to be sent in on or before Thursday, Oct. 25, addressed to the Chairman of the Company, and endorsed "Tender for Sulphate."
The Directors do not bind themselves to accept the highest or any tender.
By order,
THOS. C. FULLER,
Secretary.
Gas-Works, The Dane, Margate,
Oct. 12, 1894.

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OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality Sample and Price on application.
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State Price f.o.r. at nearest Station to Gas-Works.

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THE Gas Committee of the Belfast Cor- poration invite TENDERS for the supply of 80,000 tons of best screened GAS COAL, to be delivered free and trimmed in Barges in Belfast Harbour, between the 1st of November, 1894, and the 30th of September, 1895.
No tender for less than 10,000 tons will be considered.
Monthly quantities and particulars may be obtained from the Manager of the Gas-Works.
Tenders, on office forms, endorsed "Tender for Coal," should be delivered at my Office not later than the 31st of October.
The lowest or any tender not necessarily accepted.
SAMUEL BLACK,
Town Clerk.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the supply of FIRE-CLAY GOODS (Retorts, Bricks, &c.) required for Repairs at their Neepsend and Effingham Street Stations during the next Twelve Months.
Specifications and Forms of Tender may be had on application to the Company's Engineer, Mr. Fletcher W. Stevenson.
The Directors do not bind themselves to accept the lowest or any tender.
Sealed tenders, marked "Tender for Fire-Clay Goods," must be delivered by post, addressed to the undersigned, not later than Saturday, Nov. 3 next.
HANBURY THOMAS,
General Manager
Commercial Street, Sheffield,
Oct. 13, 1894.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
INCORPORATED BY ACT OF PARLIAMENT.

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Notice is Hereby also Given, that the Transfer Books will be closed from the 23rd inst to the 6th of November, both days inclusive.
By order of the Board,
R. S. GARDINER,
Secretary.
No. 21, Austin Friars, London, E.C.,
Oct. 15, 1894.

Price 15s., Limp Cloth, the Fourteenth Yearly

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OF THE
Metropolitan Water Companies,

Chelsea, East London, Grand Junction, Kent, Lambeth, New River, Southwark and Vauxhall, and West Middlesex—showing the Capital, Income, Expenditure, Profits, and Dividends per Million and per Thousand Gallons of Water supplied; the proportion of Expenditure and Profits to Gross Income; and the Income, Expenditure, and Profits per House, &c., supplied for the Year ended December 31, 1893, or March 31, 1894, together with the quantity of Water supplied, the estimated daily quantity supplied for domestic and other purposes, the quantity supplied per head of population, &c., &c., for the Year ended December 31, 1893.

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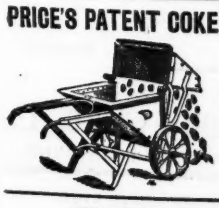
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YIELD OF GAS PER TON . 10,375 CUBIC FEET.
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AND SONS, Limited,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS
ANVILS, VICES,
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BOLDON GAS COALS.
Worked by THE HARTON COAL CO., LTD.
Output about 3000 tons per day.

Analysis—

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to
The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Bombay Gas Company, Ipswich Gaslight Company, Devonport Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.
For prices, &c., apply to the
HARTON COAL COMPANY,
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W. H. PARKINSON,
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HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cubic feet.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

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THE SILICA FIRE-BRICK COMPANY,

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MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY
Strongly recommended where EXCESSIVE HEATS have to be maintained.

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Yield of Gas per ton . . . . . 13,155 cub. ft.
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Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

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Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

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JOSEPH TAYLOR & CO.,
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Practical Makers of all kinds of Saturators, and Specialists in every description of Lead Work required in connection with Sulphate Plants.

Special attention to Repairs.

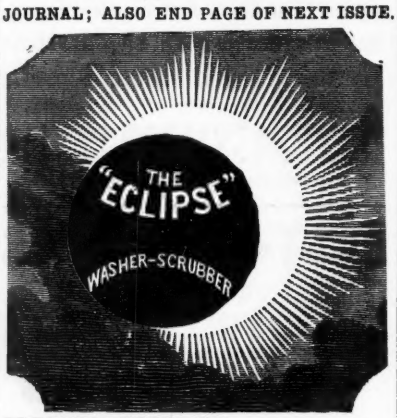
Seven Saturators placed with us the present Year.

HIGHEST REFERENCES ON APPLICATION.

THE DRUM

FOR PUMPING AIR, WATER, SEMI-FLUIDS, &c.
See Advertisement in last and next issue.

SEE ADVT., p. 720 OF LAST WEEK'S JOURNAL; ALSO END PAGE OF NEXT ISSUE.



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ENGLISH & SCOTCH CANNELS.
REAL SILKSTONE GAS COAL
ANALYSIS AND PRICES ON APPLICATION.
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ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE. — Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

THORNLEY GAS COALS

WORKED BY THE
WEARDALE IRON AND COAL COMPANY, Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—

[COPY.]
TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.
Tudhoe Gas-Works,
Spennymoor,
8th June, 1893.

Messrs. The
WEARDALE IRON & COAL COMPANY, LTD.

GENTLEMEN,

For the last two months we have used your **THORNLEY GAS COAL** exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.

Yield of Gas per ton: 10,300 cubic feet.
Yield of Coke: 13½ cwt.
Illuminating Power of Gas, average of a series of tests, **17 Sperm Candles.**
The Coke was of excellent quality.
The following is a complete ultimate Analysis of the Coal.

	PER CENT.
Carbon	83·128
Hydrogen	5·116
Oxygen	7·401
Nitrogen	0·585
Sulphur	0·620
Ash	3·130
Water	0·020
	100·000

Analysis of the Coke.

Carbon	93·31
Sulphur	0·61
Ash	5·00
Moisture	1·08
	100·00

I am, Gentlemen,
Yours truly,
A. B. COWAN,
Manager.

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

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GASEOUS FIRING FOR LARGE OR SMALL RETORT-SETTINGS

PLANS, SPECIFICATIONS, AND ESTIMATES SUBMITTED.

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ENGINEERS & CONTRACTORS
FOR THE ERECTION OF GAS AND WATER WORKS COMPLETE, AND FOR EXTENSIONS AND RENEWALS.

CURLEY CANNEL.

Mr. JOHN METHVEN, Gas Engineer of The Gaslight and Coke Company, Beckton, has tested this famous Cannel, and says: "The above results indisputably place this Cannel at the *head of the list* of the most valuable Cannel raised in this Kingdom."

Particulars, Analysis, and Prices to be had on application to

S. CHANDLER & SONS, PONTYBODKIN, NORTH WALES.

Wrought-Iron TUBES And Fittings and Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM

BRASS GAS-FITTINGS GAS-VALVES STEAM & WATER VALVES TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.

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Every Description of Gas Apparatus.

ELLAND, YORKS.

OIL GAS

BETTER TERMS CAN BE OBTAINED FROM SUPPLIERS OF OIL IF PURCHASERS HAVE THEIR OWN

TANK-WAGGONS.

HURST, NELSON, & Co., LTD.,

THE GLASGOW ROLLING STOCK AND PLANT WORKS, MOTHERWELL.

REGISTERED OFFICE:

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IMPORTANT TO GAS COMPANIES.

THE MAXIM CARBURETTOR,

FOR ENRICHING GAS IN BULK.

Used for the last Three Years by all the principal London Gas Companies, and since adopted by numerous Suburban and Provincial Companies and Corporations.

THE CARBURETTOR is INEXPENSIVE, EASILY FIXED, and ENTIRELY SUPERSEDES the use of CANNEL COAL.

FOR PRICES AND FULL PARTICULARS, APPLY TO

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

PUMPS FOR GAS & WATER WORKS.

FIRST AWARDS EVERYWHERE.

TELEGRAMS: "EVANS WOLVERHAMPTON."

APPLY FOR CATALOGUE NO. 8.

TRADE MARK.

(No Trappets.

Fig. 600. "CORNISH" STEAM-PUMP FOR WATER.

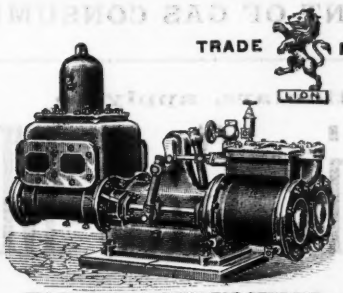

Fig. 670. DUPLEX PUMP FOR GENERAL PURPOSES.

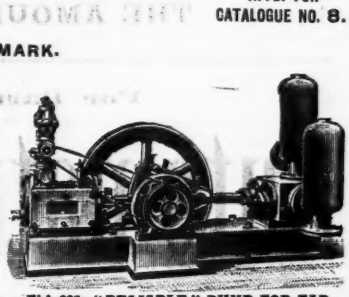

Fig. 668. "RELIABLE" PUMP FOR TAR AND THICK FLUIDS.

Fig. 703. SINGLE RAM PUMP FOR BOILER FEEDING, &c.

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WOLVERHAMPTON. LONDON OFFICE: 16, Union Court, Old Broad Street, E.C.

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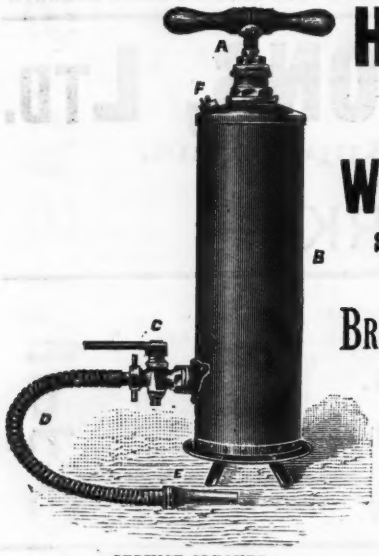
Registered Office—28, ROYAL EXCHANGE SQUARE, GLASGOW.



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What is the Continuous?

IT IS A PREPAYMENT ATTACHMENT

THAT IS

UNFAKEABLE & UNBREAKABLE

BY HAND OR COIN PRESSURE.

THE MONEY IN THE BOX IS ALWAYS EXACTLY CORRECT WITH THE AMOUNT OF GAS CONSUMED.

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1, UPPER BROOK STREET, AND 6, ROSAMOND STREET EAST, MANCHESTER.

5, MERRION STREET, LEEDS.

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POWER

MACHINERY

FOR

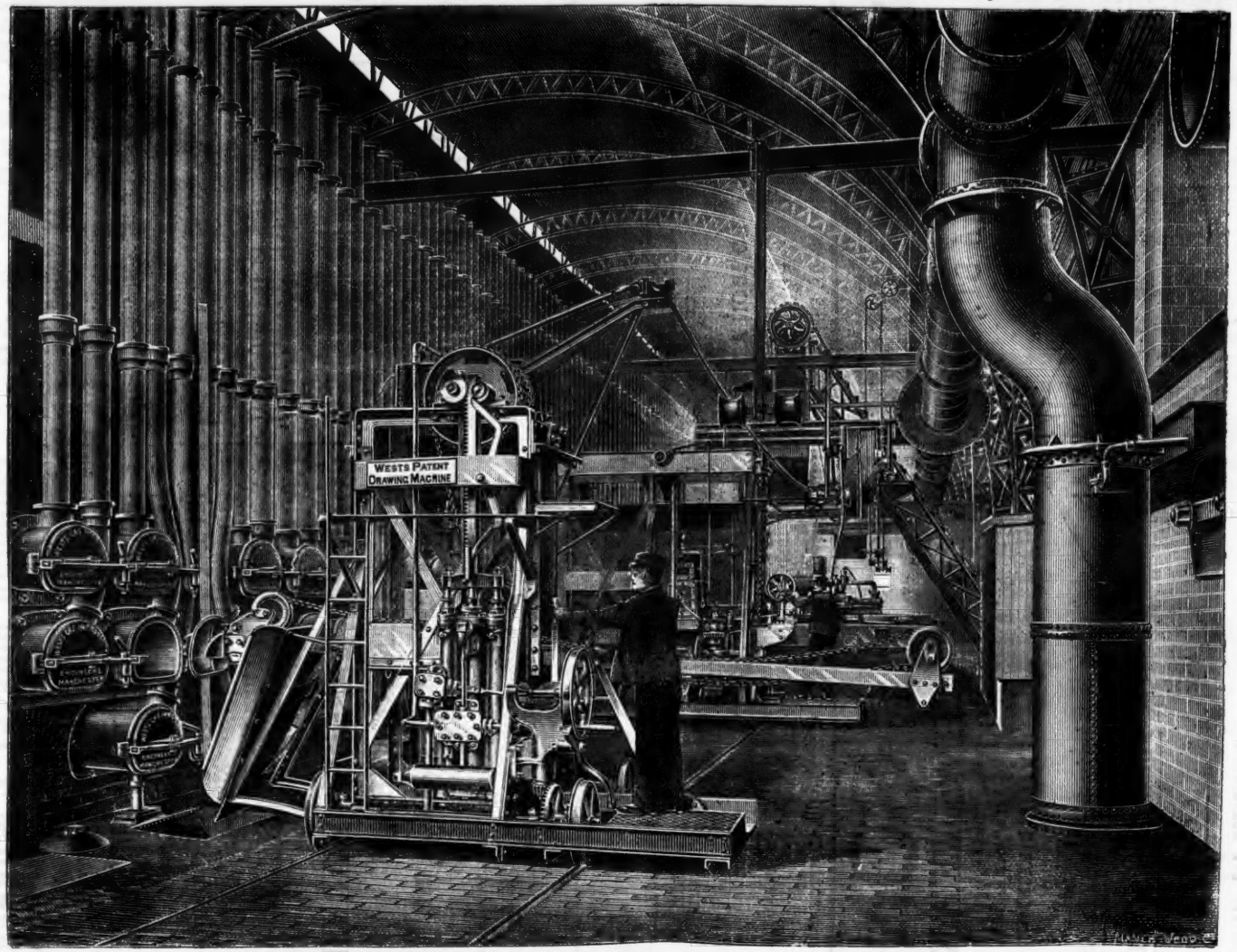
CHARGING

AND

DRAWING

GAS-

RETORTS.



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Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
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PATENT

MACHINE-MADE GAS-RETORTS.

GAS AND WATER PIPES

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CASTINGS OF EVERY DESCRIPTION.

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Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

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WIDNES.	BRIGHOUSE.	WHITEHAVEN.
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From 30 to 1100 Candle Power.

THEY ARE SUITABLE FOR GAS OF EVERY CANDLE POWER,

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THE "BRAY" REFLECTING LIGHT

Is an unequalled combination of SIMPLICITY, CHEAPNESS, and EFFICIENCY.

GIVES REMARKABLE LIGHTING VALUE FOR GAS CONSUMED.

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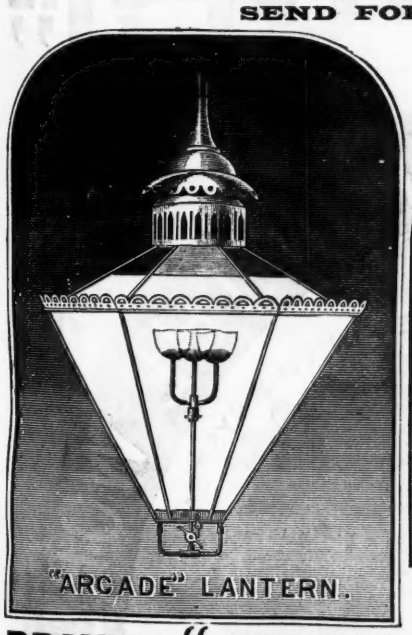

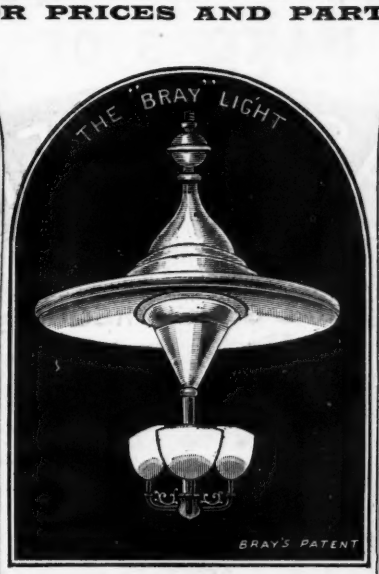

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Gas Managers should try them on Consumers' Fittings; and they would see at once how to compete more effectively with the Electric Light.

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The best KENTUCKY CANNEL in the Market.

SAMPLE CARGO will demonstrate the extraordinary value of this Coal, and of the resultant Coke and other Bye-Products.

The unlimited quantity and REDUCED PRICE of this Material makes it the most satisfactory and economical Gas Enricher now available.

COKE.—Briefly the "Bear Creek" Cannel produces a first-class Coke—that is, by itself, and unmixed with Coke from Common Coals—merchantable, comparing favourably with Coke from the Standard Gas Coals.

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MAKERS OF
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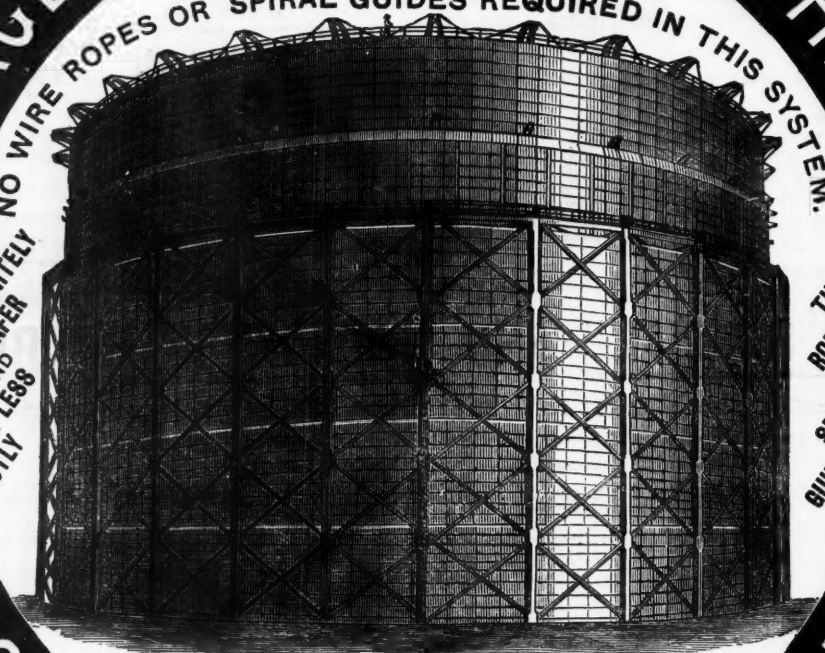
THE LARGEST GASHOLDER IN THE WORLD
GASHOLDERS OUR SPECIALITY
NO WIRE ROPES OR SPIRAL GUIDES REQUIRED IN THIS SYSTEM.
INFINITELY SAFER AND FAR LESS COSTLY
THAN ROPES OR SPIRAL GUIDES.



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Patent Automatic Machinery
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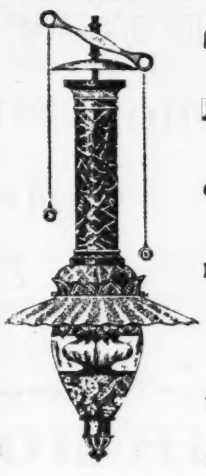

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LIGHT for LIGHT
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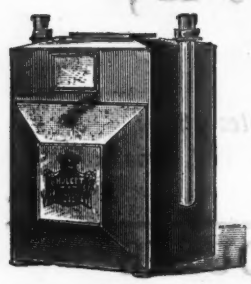

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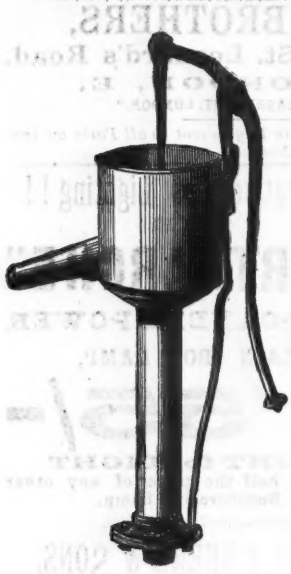
REDUCED PRICES.

Made with or without Water Connections.

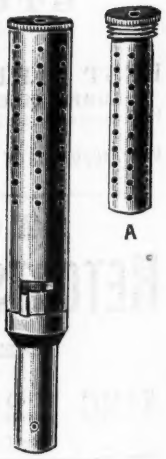


LAMP LIGHTERS'

Torches,

CONSTRUCTED SO THAT THE INTERIOR "A" CAN BE REMOVED FOR CLEANING.

PRICE 6/- EACH; OR WITH 6-FOOT STICK, 7/-.



SYPHON PUMPS,

LAMP-POSTS,

PRESSURE-GAUGES,

LAMP-GOVERNORS.

55 & 56, HIGH HOLBORN, LONDON.

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